



This document is scheduled to be published in the Federal Register on 01/08/2016 and available online at <http://federalregister.gov/a/2015-32645>, and on FDsys.gov

Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R4-ES-2015-0178; FXES11130900000C2-156-FF009E32000]

RIN 1018-AY84

**Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to
Downlist the West Indian Manatee, and Proposed Rule to Reclassify the West
Indian Manatee as Threatened**

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule and notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to reclassify the West Indian manatee from endangered to threatened under the Endangered Species Act of 1973, as amended (Act) due to substantial improvements in the species' overall status since the original listing in 1967 as endangered under the Endangered Species Conservation Act of 1966. This proposed action is based on a thorough review of the best scientific and commercial data available, which indicate that the West Indian manatee no longer meets the definition of endangered under the Act. If this proposal is finalized, the West Indian manatee including its subspecies would remain protected as a threatened species under the Act. This document also constitutes our 12-month finding on the petition received to reclassify this species.

DATES: *Comment submission:* To allow us adequate time to consider your comments on this proposed rule, we must receive your comments on or before [**INSERT DATE 90 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**].

Public Hearing: An informational open house and public hearing are scheduled for Saturday, February 20, 2016 (see the **ADDRESSES** section and the **Public Hearing** section of **SUPPLEMENTARY INFORMATION** for more information).

ADDRESSES: You may submit comments on this proposed rule by one of the following methods:

- *Federal eRulemaking Portal:* <http://www.regulations.gov>. Follow the instructions for submitting comments on Docket No. FWS–R4–ES–2015–0178.

- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: Docket No. FWS–R4–ES–2015–0178; U.S. Fish and Wildlife Service Headquarters, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments **only** by the methods described in this section. We will post all comments on <http://www.regulations.gov>. This generally means that we will post any personal information you provide us (see the **Public Comments** section of **SUPPLEMENTARY INFORMATION** for more information).

Public Hearing:

We will hold a public hearing in Orlando, Florida on Saturday, February 20, 2016, from 3:00 p.m. to 6:00 p.m. at the Buena Vista Palace Conference Center, 1900 Buena Vista Drive, Orlando, Florida 32830 in the Center's Great Hall; (see the **Public Hearing** section of **SUPPLEMENTARY INFORMATION**).

Comments will be accepted orally or in writing at the public hearings. See the **Public Hearing** section of **SUPPLEMENTARY INFORMATION**. Comments will be accepted orally or in writing at the public hearings.

FOR FURTHER INFORMATION CONTACT: Jay Herrington, Field Supervisor, North Florida Ecological Services Office, by telephone at 904–731–3191, or by facsimile at 904–731–3045; or at the following address: 7915 Baymeadows Way, Suite 200, Jacksonville, FL 32256; Edwin Muñiz, Field Supervisor, Caribbean Ecological Services Office, by telephone at 787–851–7297, or by facsimile at 787–851–7441; or at the following address: Road 301, Km. 5.1, P.O. Box 491, Boquerón, PR 00622. If you use

a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339, 24 hours a day, 7 days a week.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why We Need to Publish this Proposed Rule

- In April 2007, we completed a 5-year status review, which included a recommendation to reclassify the West Indian manatee from endangered to threatened.
- In December 2012, we received a petition submitted by the Pacific Legal Foundation, on behalf of Save Crystal River, Inc., requesting that the West Indian manatee and subspecies thereof be reclassified from its current status as endangered to threatened, based primarily on the analysis and recommendation contained in our April 2007 5-year review.
- On July 2, 2014, we published a 90-day finding that the petition presented substantial information indicating that reclassifying the West Indian manatee may be warranted (79 FR 37706).
- This proposed rule, in accordance with section 4(b)(3)(B) of the Endangered Species Act (Act), also constitutes our 12-month finding that the petitioned action is warranted.

Summary of the Major Provisions of This Proposed Rule

- We propose to reclassify the West Indian manatee from endangered to threatened.
- This proposed rule also constitutes our 12-month petition finding.

The Basis for Our Action

- Castelblanco-Martínez et al.'s (2012, pp. 129–143) population viability analysis (PVA) model for the West Indian manatee describes a metapopulation with positive growth, and Runge et al.'s Core Biological Model (2015, p. 13) predicts that it is unlikely (< 2.5 percent chance) that the southeastern U.S. population will fall below 4,000 total individuals over the next 100 years, assuming current threats remain constant indefinitely.
- Current population estimates are 6,350 manatees in the southeastern continental United States and 532 manatees in Puerto Rico. These numbers reflect a very low percentage chance of this animal going extinct in the next 100 years.
- Outside the United States, habitat fragmentation and loss is the main threat. Within the United States, watercraft collisions and the loss of winter warm-water habitat are the main threats. Our review of the best scientific and commercial information available and analyses of threats and demographics conclude that threats are being addressed and reduced throughout the species' range.
- Based on our review, we conclude that the West Indian manatee no longer meets the Act's definition of endangered and should be reclassified as threatened.

Public Comments

We intend that any final action resulting from this proposed rule will be as accurate and as effective as possible. Therefore, we request data, comments, and new information from concerned governmental agencies (including but not limited to State and Federal agencies and foreign governments), Native American Tribes, the scientific community, industry, or any other interested party concerning this proposed rule. The comments that will be most useful and likely to influence our decision are those that are supported by data or peer-reviewed studies and those that include citations to, and analyses of, applicable laws and regulations. Please make your comments as specific as possible and explain the basis for them. In addition, please include sufficient information with your comments to allow us to authenticate any scientific or commercial data you reference or provide. We particularly seek comments concerning the following:

(1) The historical and current status and distribution of the West Indian manatee within and outside the United States (including both of its subspecies, the Florida manatee and Antillean manatee), data regarding its biology and ecology, and ongoing conservation measures for the species and its habitat.

(2) Relevant data concerning threats (or lack thereof) to West Indian manatees including any new data or models related to climate change, as well as the extent of regulatory protections and management that would continue to be provided to this

species, if this rule were finalized and the West Indian manatee became a threatened species.

(3) Additional information concerning the range, distribution, population size, and trends for the West Indian manatee, including both of its subspecies.

(4) Current or planned activities within the geographic range of the West Indian manatee that may impact or benefit the species, including activities that affect aquatic plant communities, freshwater and warm-water sources, sheltered waterbodies, boat access projects, port expansion projects, and others.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that a determination as to whether any species is a threatened or endangered species must be made “solely on the basis of the best scientific and commercial data available.”

Prior to issuing a final rule on this proposed action, we will take into consideration all additional information and comments that we receive. Such information may lead to a final rule that differs from this proposal. All comments and recommendations, including names and addresses, will become part of the administrative record for the final rule.

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you

should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time.

If you submit a comment via <http://www.regulations.gov>, your entire comment, including any personal identifying information, will be posted on the website. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Please note that comments posted to this website are not immediately viewable. When you submit a comment, the system receives it immediately. However, the comment will not be publically viewable until we post it, which might not occur until several days after submission.

Similarly, if you mail or hand-deliver hardcopy comments that include personal identifying information, you may request at the top of your documents that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. To ensure that the electronic docket for this rulemaking is complete and all comments we receive are publicly available, we will post all hardcopy comments on <http://www.regulations.gov>.

Peer Review

In accordance with our policy published on July 1, 1994 (59 FR 34270), we will seek the expert opinions of at least three specialists in the field who were not involved in developing this proposed rule. The purpose of such review is to ensure that our determination is based on scientifically sound data, assumptions, and analysis. We will

send peer reviewers copies of this proposed rule immediately following publication in the **Federal Register**. We will invite these peer reviewers to comment during the public comment period. We will consider all comments and information received from peer reviewers during the 90-day comment period on this proposed rule, as we prepare a final rule.

Public Hearing

Section 4(b)(5) of the Act (16 U.S.C. 1531 *et seq.*) provides for one or more public hearings on this proposal, if requested. Given the level of interest in this review, we have scheduled a formal public hearing to afford the public and all interested parties with an opportunity to make formal oral comments on the proposed reclassification of the West Indian manatee.

We will hold the public hearing at the location listed in **ADDRESSES** on the date listed in **DATES**. The Public hearing will last from 3:00 p.m. to 6:00 p.m. We will hold a public informational open house prior to the hearing from 1:30 p.m. to 2:30 p.m. to provide an additional opportunity for the public to gain information and ask questions about the proposed rule. This open house session should assist interested parties in preparing substantive comments on the proposed rule.

Persons needing reasonable accommodations in order to attend and participate in the public hearings should contact Chuck Underwood of the North Florida Ecological Services Office at 904-731-3332 or via e-mail to chuck_underwood@fws.gov as soon as

possible. In order to allow sufficient time to process requests, please contact us for assistance no later than 1 week before the hearing.

Written comments submitted during the comment period receive equal consideration with oral comments presented at a public hearing. All comments we receive at the public hearing, both oral and written, will be considered in making our final decision.

Previous Federal Actions

The Florida manatee (*Trichechus manatus latirostris*), a subspecies of the West Indian manatee (*Trichechus manatus*), was listed as endangered in 1967 (32 FR 4001, March 11, 1967) under the Endangered Species Preservation Act of 1966 (Pub. L. 89–669; 80 Stat. 926). After adoption of the Endangered Species Conservation Act of 1969 (Pub. L. 91–135; 83 Stat. 275), the listing was amended in 1970 to expand the Florida manatee listing to include the West Indian manatee throughout its range, including in the Caribbean Sea and northern South America. This amendment added the Antillean manatee (*Trichechus manatus manatus*) to the listing (35 FR 18319, December 2, 1970). Species listed under the Endangered Species Conservation Act, including the West Indian manatee, were subsequently grandfathered into the List of Endangered and Threatened Wildlife under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and the West Indian manatee remains listed as an endangered species under the Act. We originally issued a recovery plan for the West Indian manatee in 1980, which included both Florida and Antillean manatees. We completed a recovery plan for the Florida

subspecies in 1989, revised it in 1996, and completed another in 2001 (USFWS 2001). In 1986, we completed a recovery plan for the Puerto Rico population of the Antillean manatee (USFWS 1986).

We published notices in the **Federal Register** on July 22, 1985, and on November 6, 1991 (50 FR 29901 and 56 FR 56882, respectively), stating that we were conducting 5-year reviews for all endangered and threatened species listed before January 1, 1991, including the West Indian manatee. In 2005 and 2006, we published notices in the **Federal Register** (70 FR 19780, April 14, 2005; 71 FR 14940, March 24, 2006) that we were initiating another 5-year status review for the West Indian manatee. In this 5-year review, which was completed on April 6, 2007, we recommended downlisting the species to threatened (USFWS 2007, p. 35). A copy of the 2007 5-year status review is available on our website (http://ecos.fws.gov/docs/five_year_review/doc3771.pdf).

On December 14, 2012, we received a petition from the Pacific Legal Foundation on behalf of Save Crystal River, Inc., requesting that the West Indian manatee and its subspecies be reclassified from endangered to threatened under the Act, based primarily on the analysis and recommendation presented in our 2007 5-year review for the species. We reviewed the petition and found that it presented substantial information indicating that reclassifying the West Indian manatee to threatened may be warranted. We published a notice announcing our 90-day finding and initiation of the species' status review in the **Federal Register** on July 2, 2014 (79 FR 37706).

Current Federal Action

Section 4(b)(3)(B) of the Act requires that, for any petition to revise the Lists of Endangered and Threatened Wildlife and Plants (Lists) that presents substantial information, we make a finding within 12 months of the date of the receipt of the petition on whether the requested action is either (a) not warranted, (b) warranted, or (c) warranted but precluded from immediate proposal. This proposed rule constitutes our 12-month finding that the action sought by the December 2012 petition is warranted. To ensure that our review is complete and based on the best available scientific and commercial information, in our July 2, 2014, **Federal Register** notice of the 90-day finding we solicited information from the public on the status of the West Indian manatee, threats to the species, conservation measures for the species, and other relevant information.

We received 49,571 comments from the public in response to our notice of status review. Most were in relation to the Florida manatee (*Trichechus manatus latirostris*), and most of those were e-mails or letters expressing either support for or opposition to the action being considered, with no supporting information. These comments were noted but are not being considered in preparation of this proposed rule. Several submittals, however, shared peer-reviewed literature, observations from State and Federal partners, and survey data, and these data were considered and are addressed as appropriate. Similarly, the few species-specific reports we received on the Antillean manatee (*Trichechus manatus manatus*) were also evaluated and incorporated as appropriate.

Species Information

Distribution

The range of the West Indian manatee includes the southeastern United States (primarily Florida), the east coast of Mexico and Central America, northeastern South America, the Greater Antilles (Cuba, Hispaniola, Puerto Rico, and Jamaica), and parts of the Lesser Antilles, including Trinidad and Tobago. Manatees in the southeastern United States are found in Florida year-round and occasionally in Georgia and Alabama during the warmer months, and vagrants can be found as far north as Massachusetts and as far west as Texas (Beck 2015, unpubl. data; Fertl *et al.* 2005, p. 74; Domning and Hayek 1986, p. 136; Lowery 1974, p. 481; Gunter 1941, p. 64). Florida vagrants are also known to occur in the Bahamas and Cuba (Melillo-Sweeting *et al.* 2011, p. 505; Alvarez-Alemán *et al.* 2010, p. 148; Odell *et al.* 1978, p. 289).

Outside of the southeastern United States, the West Indian manatee has an extensive but fragmented distribution (Marsh *et al.* 2011, p. 384) and occurs in 20 countries (Table 1). Manatees are found in the Greater Antilles (*i.e.*, Cuba, Jamaica, Hispaniola, and Puerto Rico) and discontinuously along the Gulf coast of Mexico, the Caribbean coast of Central and South America, and along the Atlantic coast of South America as far south as Bahia, Brazil (Self-Sullivan and Mignucci-Giannoni 2012, p. 36). Except for rare sightings, manatees are no longer found in the Lesser Antilles (*i.e.*, those Caribbean islands extending from the Virgin Islands to Grenada) (Lefebvre *et al.* 2001, p. 425). The few individuals that have been reported for the U.S. and British Virgin Islands,

Turks and Caicos, Cayman Islands, St. Maarten, Curacao, and Bonaire are considered vagrant from nearby populations (Self-Sullivan and Mignucci-Giannoni 2012, p. 40; USFWS 2007, p. 27).

In Puerto Rico, recent island-wide aerial surveys flown to characterize manatee distribution patterns (USFWS Manatee Aerial Surveys 2015, unpubl. data) confirm the observations of Powell *et al.* (1981, p. 644) and Rathbun *et al.* (1985, p. 9) that manatees are most frequently observed along the south-central and eastern coasts and not on the northwestern coast. The former Roosevelt Roads Naval Station (RRNS) area, the northwest coast of Vieques, Bahía de Jobos, and Guayanilla consistently presented a high number of observations (USFWS Manatee Aerial Surveys, 2015 unpubl. data). In localized aerial surveys on the southwestern coast, between Cabo Rojo and Ponce, sightings were common throughout the region, but concentrated at Cabo Rojo, Bahía Bioluminiscente and Montalva in Lajas, and Bahías de Guayanilla and Tallaboa in Guayanilla (Mignucci-Giannoni 2006, p. 13).

TABLE 1.—*West Indian manatees, range countries where found: trends, population estimates, national listing status.*

Abbreviations: U—Unknown; D—Declining; S—Stable; I—Increasing; En—Endangered; CrEn—Critically Endangered (adapted from UNEP 2010, p. 11 and Castelblanco-Martínez *et al.* 2012, p. 132, Martin *et al.* 2015, p. 44, unless otherwise cited).

Country		Trend ¹	Population Estimate ¹	National Listing Status
Greater Antilles (1,382)				
1A ²	United States (Puerto Rico)	S	532 (mean) ³	En (PRDNER 2004)
2	Cuba	U/D	500	En (Álvarez-Alemán 2012)
3	Haiti	U	100	No information
4	Dominican Republic	D	200	CrEn (MMARNRD 2011)

5	Jamaica	U/D	50	No information
Mexico, Central America (3,600)				
6	Mexico	U	1,500	En
7	Belize	U/D	1,000	En
8	Guatemala	U	150	CrEn (CONAP 2009)
9	Honduras	S	100	No information
10	Costa Rica	D	200	En
11	Panama	U	150	No information
12	Nicaragua	D	500	No information
South America (1,800)				
13	Colombia	U/D	500	CrEn (Rodríguez-Mahecha <i>et al.</i> 2006)
14	Venezuela	D	200	CrEn (Ojasti and Lacabana 2008)
15	Suriname	D	100	No information
16	French Guiana	S	100	No information
17	Guyana	D	100	No information
18	Trinidad and Tobago	D	100	En (MCT 2002)
19	Brazil	U/D	700	CrEn (Barbosa <i>et al.</i> 2008)
North America (6,360)				
20	The Bahamas	I	10	No information
21B ²	United States (Southeast)	S/I	6,350	En (FAC 68A–27.0031)
TOTAL Estimated Population			13,142	

¹Trends and estimates described in Table 1 for manatee populations outside the United States are, in large part, based on the personal opinions of local experts and are not based on quantified analyses of trends in country population counts or demographics. Such data from these countries are limited or absent, making most of these assessments conjectural (UNEP 2010, p. xiv).

²Note that Locations 1A and 21B refer to manatee populations in the United States (in Puerto Rico and the southeastern United States, respectively).

³Based on adjusted aerial survey counts (Pollock *et al.* 2013, p. 8).

West Indian manatees are at the northern limit of their range in the southeastern United States. This limitation is based on the species' intolerance for cold. Prolonged

exposure to cold water temperatures results in debilitation and/or death due to cold stress syndrome (Bossart *et al.* 2004, p. 435; Rommel *et al.* 2002, p. 4). At this northern reach of their range, manatees historically relied upon warm, temperate coastal and inshore waters in south Florida and on natural warm-water springs scattered throughout the area for warmth. Industrial outfalls, including power plant effluents, have expanded the manatees' range in Florida since their appearance in the 1940s. A majority of manatees now winter at these sites.

In Florida, manatees have been identified as occurring in four, relatively distinct, regional management units (formerly referred to as subpopulations): An Atlantic Coast unit that occupies the east coast of Florida, including the Florida Keys and the lower St. Johns River north of Palatka; an Upper St. Johns River unit that occurs in the river south of Palatka; a Northwest unit that occupies the Florida Panhandle south to Hernando County; and a Southwest unit that occurs from Pasco County south to Whitewater Bay in Monroe County (USFWS 2001, p. 3 and 2007c, pp. 12–13; Figure 1). Each of these management units includes individual manatees that tend to return to the same warm-water site(s) each winter and have similar non-winter distribution patterns. The exchange of individuals between these units is limited during the winter months, based on data from telemetry studies (Rathbun *et al.* 1990, entire; Reid *et al.* 1991, pp. 180–181; Deutsch *et al.* 1998, entire; Weigle *et al.* 2001, entire; Deutsch *et al.* 2003, entire) and photo-identification studies (Rathbun *et al.* 1990, entire; USGS Sirenia Project Manatee Individual Photo-identification System (MIPS), 2015, unpubl. data; Florida Fish and Wildlife Conservation Commission (FWC Fish and Wildlife Research Institute (FWRI)

MIPS, 2015, unpubl. data).

Taxonomy and Species Description

The West Indian manatee, *Trichechus manatus*, is one of three living species of the genus *Trichechus* (Rice 1998, p. 129). The West Indian manatee includes two recognized subspecies, the Antillean manatee, *Trichechus manatus manatus*, and the Florida manatee, *Trichechus manatus latirostris* (Rice 1998, p. 129). Each subspecies has distinctive morphological features and occurs in discrete areas with rare overlap between ranges (Hatt 1934, p. 538; Domning and Hayek 1986, p. 136; and Alvarez-Alemán *et al.* 2010, p. 148). Recent genetic studies substantiate the uniqueness of the Florida subspecies, as its genetic characteristics have been compared with other populations from the Antillean subspecies found in Puerto Rico and Belize (Hunter *et al.* 2010, p. 599; Hunter *et al.* 2012, p. 1631).

West Indian manatees are large, fusiform-shaped animals (wide in the middle and tapered at both ends) with skin that is uniformly dark grey, wrinkled, sparsely haired, and rubber-like. Manatees possess paddle-like forelimbs, no hind limbs, and a round, beaver-like tail. Their bones are massive and heavy with no marrow cavities in the ribs or long bones of the forearms (Odell 1982, p. 829). Adults average about 3.0 meters (m) (9.8 feet [ft]) in length and 400 kilograms (kg) (900 pounds [lb]) in weight, but may reach lengths of up to 4.5 m (15 ft) (Husar 1978, p. 1) and weigh as much as 1,620 kg (3,570 lb) (Rathbun *et al.* 1990, p. 23). Newborns average 1.2 to 1.4 m (4 to 4.5 ft) in length and weigh about 30 kg (66 lb) (Odell 1981, p. 134). The nostrils, located on the upper snout,

open and close by means of muscular valves as the animals surface and dive (Husar 1977, p. 2; Hartman 1979, p. 73). A muscular, flexible, upper lip is used with the forelimbs to manipulate food into the mouth (Hartman 1979, p. 85). Bristles are located on the upper and lower lip pads (Marshall *et al.* 2000, p. 649). Molars designed to crush vegetation form continuously at the back of the jaw and move forward as older ones wear down (Domning and Hayek 1984, p. 105). The eyes are very small, close with sphincter action, and are equipped with inner membranes that can be drawn across the eyeball for protection. Externally, the ears are minute with no pinnae (Husar 1977, p. 2).

Lifespan, Mating, and Reproduction

The lifespan of the manatee is not known with certainty. There is a record in Florida of a captive 67-year old manatee (South Florida Museum 2015), and there are documented longevity records of over 55 years in the wild. The average age of Florida manatees dying in Florida is 7.7 years (Pitchford 2009 p. 22). Manatee mortality records from Puerto Rico found adults aged from 22 to 28 years old (Mignucci-Giannoni *et al.* 2000, p. 194).

Manatees generally become sexually mature between 3 to 5 years of age (Boyd *et al.* 1999 and Glaser and Reynolds 1997, in UNEP 2010, p. 4), and female manatees continue reproducing in the wild into their thirties (Marmontel 1995, in UNEP 2010, p. 4). After a gestation period of between 11 and 14 months (Rathbun *et al.* 1995, Reynolds and Odell 1991, in UNEP 2010, p. 4), female manatees usually give birth to a single calf, although there are a few documented cases of twins (Marmontel 1995, Rathbun *et al.*

1995, SEMARNAT 2001, Wells *et al.* 1999, in UNEP 2010, p. 4).

Habitat

West Indian manatees use a wide variety of freshwater, estuarine, and marine habitats for their life-history needs (i.e., feeding and drinking, traveling, resting, thermoregulation, mating, and nursing) and survival. Manatees feed on freshwater and marine plants, including submergent, emergent, and shoreline vegetation. Significantly, manatees seek out sources of fresh drinking water, especially when in marine and estuarine habitats. Manatees tend to travel along the waterward edges of plant beds and in and near channels. Sheltered embayments and other such areas are used for resting and, for mothers with calves, as areas to nurse and nurture offspring. Mating activity takes place in all types of habitat; estrus females prefer shallow areas where they can rest from mating activity. In the inland and coastal waters of peninsular Florida, manatees use warm-water springs, warm industrial outfalls, and other warm-water sites as shelter during the winter months (Hartman, 1974, pp. 8–30, Lefebvre *et al.* 2001, pp. 451–453, Stith *et al.* 2006, pp. 4–5), several of which are designated manatee protection areas. In warmer months, manatees leave these sites and can disperse great distances.

Manatees in Central and South America are found in coastal rivers and estuaries, while those in the Antilles are found more often in coastal marine habitats (Lefebvre *et al.* 2001, p. 463). In Puerto Rico, Antillean manatees are mostly found in protected bays and shallow coves with seagrass beds for feeding and resting and utilize river mouths and estuaries when seeking freshwater for drinking. Seagrass, freshwater, and shelter are

described as the three primary ecological attributes needed to ensure long-term manatee survival in Puerto Rico (Drew *et al.* 2012, p. 19). Outside the United States, manatees occur within estuaries, lagoons, and interconnected rivers, such as those found in Chetumal Bay between Mexico and Belize. Chetumal Bay is a specially designated manatee protection area and wildlife sanctuary (UNEP 2010, p. 60).

Several factors can affect the viability of manatee habitats. Human activities such as dredge and fill, soil runoff, propeller dredging, anchoring, etc., are known to result in the loss of seagrass and foraging habitat (Duarte 2002, p. 194; Orth *et al.* 2006, p. 991). For example, dredging will directly remove seagrass, and sediment, suspended in the water column during dredge and fill activities, may cover neighboring seagrass beds (Auil 1998, p. 9). A significant decrease of this resource could cause stress to the population by limiting manatee grazing habitats and range.

The loss of manatees from certain areas has been attributed to, among other factors, dam construction along rivers (Colmenero-Rolón and Hoz-Zavala 1986, in UNEP 2010, p. 59; Montoya-Ospina *et al.* 2001, in UNEP 2010, p. 29). Historically, anthropogenic influences (i.e., dams, drainage of wetlands, mangrove destruction, etc.) have altered manatee habitat significantly and thus affected the number of animals along the coast and their movements between fresh and saltwater areas (Amour 1993, in Lefebvre *et al.* 2001, p. 447; Boyle and Khan 1993, in Lefebvre *et al.* 2001, p. 447; Correa-Viana 1995, in Lefebvre *et al.* 2001, p. 446; Montoya-Ospina *et al.* 2001, in UNEP 2010, p. 30; MCT 2002, p. 15; Serrano *et al.* 2007, p. 109). As discussed below, in Florida, warm-water natural spring areas essential for the manatee's survival are

threatened by numerous factors, including diminishing spring flows, deteriorating water quality, and increasing human activities in and around spring areas (Taylor 2006, pp. 5–6).

Population Size

Within the southeastern United States, Martin *et al.* (2015 entire) provide an abundance estimate for the Florida subspecies of 6,350 manatees (with a 95 percent CI (confidence interval) between 5,310 and 7,390). Outside the southeastern United States, available population estimates are based on data of highly variable quality and should be considered only as crude approximations (UNEP 2010, p. xiv). Available population estimates suggest that there may be as many as 1,382 manatees in the Greater Antilles, 3,600 manatees in Mexico and Central America, and 1,800 manatees in South America (Table 1). This information reflects the broad distribution of the species and suggests a relatively medium to large range-wide population estimate. A sum of all estimates totals 13,142 manatees for the species throughout its range (See Table 1; UNEP 2010, p. 11; Castelblanco-Martínez *et al.* 2012, p. 132; Marsh *et al.* 2011, p. 385; Self-Sullivan and Mignucci 2012, p. 40; Martin *et al.* 2015, entire). Total estimates for manatees outside the southeastern United States and Puerto Rico alone range between approximately 3,000 and 6,700 individuals, including adults, subadults, and calves, of which fewer than 2,500 are estimated to be reproductively mature animals (Self-Sullivan and Mignucci-Giannoni 2012, p. 40). Castelblanco-Martínez *et al.* (2012, p. 132) adapted the UNEP (2010, p. 11) numbers and used an estimated initial size of 6,700 individuals in their population

viability analysis (PVA) model for the Antillean manatee population.

The Martin *et al.* (2015) study referenced above is the first quantified estimate of abundance for the Florida manatee in the southeastern United States. This estimate relied upon innovative survey techniques and multiple sources of information to estimate a Florida manatee population of 6,350 animals (Martin *et al.* 2015, p. 44). In Puerto Rico, the Service recently updated aerial survey methods to account for detection probability, which provides an improved population estimate. A total of six island-wide aerial surveys have been completed with this new method. These have resulted in the most robust counts available for the population, with an average direct minimum population count of 149 individuals (standard deviation (SD) 31). Calf numbers have also been documented with an average minimum direct calf count of 14 (SD 5) or approximately 10 percent of the direct minimum population count. A record high of 23 calves were counted in the December 2013 survey. The October 2010 survey count analysis resulted in an adjusted mean estimated population size of 532 individuals, with a 95 percent equal area confidence interval (CI) of 342–802 manatees (Pollock *et al.* 2013, p. 8).

Population Trends

In 2008, the International Union for the Conservation of Nature (IUCN) identified the West Indian manatee as a “Vulnerable” species throughout its range based on an estimate of less than 10,000 mature individuals (Deutsch *et al.* 2008, <http://www.iucnredlist.org/details/22103/0>). The population was expected to decline at a rate of 10 percent over the course of three generations (i.e., 60 years; 1 generation = circa 20 years) due to habitat loss and other anthropogenic factors (Deutsch *et al.* 2008,

online). However, each of the subspecies (Antillean and Florida) by themselves was considered to be endangered and declining due to a variety of threats identified in the IUCN classification criteria (Deutsch *et al.* 2008, online). As we have noted above, our estimate of the total West Indian manatee population currently is 13,142 (Table 1).

To the extent that it can be measured with the best available data, the West Indian manatee population trend and status varies regionally (Table 1). In the southeastern United States, the manatee population has grown, based on updated adult survival rate estimates and estimated growth rates (Runge *et al.* 2015, p. 19). Historical and anecdotal accounts outside the southeastern United States suggest that manatees were once more common, leading scientists to hypothesize that significant declines have occurred (Lefebvre *et al.* 2001, p. 425; UNEP 2010, p. 11; Self-Sullivan and Mignucci-Giannoni 2012, p. 37). Based on expert and local opinion, population trends are declining or unknown in 84 percent of the countries where manatees are found (UNEP 2010, p. 11; Marsh *et al.* 2011, p. 385; Self-Sullivan and Mignucci-Giannoni 2012, p. 40; Table 1). The magnitude of decline is difficult to assess, given the qualitative nature of these accounts (see footnote Table 1). For example, Bertram and Bertram (1973, p. 318) noted that there were several thousand manatees in Guyana in 1963, but recent estimates suggest that there may be as few as 100 manatees remaining (UNEP 2010, p. 11). It is not known if this represents an actual decline or differences in expert opinion over time.

In the Castelblanco-Martínez *et al.* (2012, pp. 129–143) PVA model for the manatee metapopulation found outside the United States, discussed above, the authors divided the metapopulation into six subpopulations identified by geographic features,

local genetic structure, ranging behavior, and habitat use. Using an initial metapopulation size of 6,700 Antillean manatees, with low human pressure and a relatively low frequency of stochastic events, their baseline PVA model describes a metapopulation with positive growth. The authors explain that the model is limited due to a lack of certainty with regard to the estimated size of the population, it does not take into account trends in local populations, and it assumes that all threats have an equal effect on the different subpopulations. Castelblanco-Martínez *et al.* (2012, pp. 141–142) state that no quantitative information exists for manatees outside the southeastern United States and that “experts and local people throughout the region agree that the number of manatees sighted per year has decreased over time.” However, manatee populations in Puerto Rico, Honduras, and French Guiana, where an estimated 732 manatees are found, are thought to be stable (Table 1).

In the southeastern United States, new population growth rates for Florida’s Atlantic Coast, Upper St. Johns River, Northwest, and Southwest Regions describe growth in each region through the 2008–2009 winter season (Runge *et al.* 2015, p. 7). More recent data are unavailable at the present time. Regional adult survival rate estimates were also updated through the same period and are higher and more precise for all regions since the last estimates were provided (Runge *et al.* 2015, p. 7; USFWS 2007, p. 65). Because the updates are through the 2008–2009 winter, they do not capture recent severe cold events of 2009–2010 and 2010–2011, the 2012–present Indian River Lagoon (IRL) die-off event; or the 2013 red tide event (Runge *et al.* 2015, p. 20; Table 2).

TABLE 2.—Manatee deaths 2009–2014 (FWC FWRI Manatee Carcass Salvage Database 2015, unpubl. data).

Year	No. of Cold-related Deaths	No. of IRL Event Deaths¹	No. of Red Tide-related Deaths	No. of All Die-off Related Deaths	No. of Deaths due to All Other Causes	Deaths from All Causes
2014	26	2	2	30	341	371
2013	36	118	276	430	400	830
2012	28	15	33	76	316	392
2011	113	0	23	136	327	463
2010	288 ²	0	0	288 ²	478	766
Total	491	135	334	960	1,862	2,822

¹ Indian River Lagoon event, 2012 to present (ongoing).

² Confirmed cold-related deaths; an additional 197 cold-related deaths are suspected.

In Florida, FWC conducts a series of statewide aerial and ground surveys of warm-water sites known to be visited by manatees during cold-weather extremes to count numbers of manatees. These surveys are conducted from one to three times each winter, depending on weather conditions (FWC FWRI Manatee aerial surveys, 2015, unpubl. data). While the number of manatees has increased over the years, in and of themselves they are not considered to be reliable indicators of population trends, given concerns about detection probabilities. However, it is likely that a significant amount of the increase does reflect an actual increase in population size when this count is considered in the context of other positive demographic indicators, including the recently updated growth and survival rates (Runge *et al.* 2015, p. 19).

In January 2010, FWC counted 5,077 manatees during a statewide survey prior to the start of the 2010 die-off. From 2010 through 2014, at least 2,822 manatees died (Table 2). In February 2015, researchers counted 6,063 manatees during a statewide

survey (FWC FWRI Manatee aerial surveys 2015, unpubl. data). These counts made before and after the die-offs, when considered in the context of positive demographic indicators (*i.e.*, growth rates and adult survival rate estimates), suggest a certain resiliency in the Florida population (FWC FWRI Manatee aerial surveys 2015, unpubl. data); Runge *et al.* 2015, p. 19).

Recovery

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of listed species, unless we find that such a plan will not promote conservation of the species. Although the West Indian manatee is listed throughout its range, Service recovery planning efforts for the West Indian manatee focused mostly on those portions of the species' range within U.S. jurisdiction. We published an initial recovery plan for the West Indian manatee in 1980 (USFWS 1980) and subsequently published recovery plans at the subspecies level for manatees found within the United States. At present, approved plans include the Recovery Plan for the Puerto Rican Population of the Antillean manatee (USFWS 1986); the Florida Manatee Recovery Plan, Third Revision (USFWS 2001); and the South Florida Multi-Species Recovery Plan (USFWS 1999).

Section 4(f) of the Act directs that, to the maximum extent practicable, we incorporate into each recovery plan: (1) Site-specific management actions that may be necessary to achieve the plan's goals for conservation and survival of the species; (2) objective, measurable criteria, which when met would result in a determination, in

accordance with the provisions of section 4 of the Act, that the species be removed from the list; and (3) estimates of the time required and cost to carry out the plan.

Revisions to the List (adding, removing, or reclassifying a species) must reflect determinations made in accordance with section 4(a)(1) and 4(b). Section 4(a)(1) requires that the Secretary determine whether a species is threatened or endangered (or not) because of one or more of five threat factors. Therefore, recovery criteria must indicate when a species is no longer threatened or endangered by any of these five factors. In other words, objective, measurable criteria contained in recovery plans (recovery criteria) must indicate when an analysis of the five factors under section 4(a)(1) would result in a determination that a species is no longer threatened or endangered. Section 4(b) requires that the determination made under section 4(a)(1) be based on the best available science.

Thus, while recovery plans are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved, they are not regulatory documents and cannot substitute for the determinations and promulgation of regulations required under section 4(a)(1). Determinations to remove or reclassify a species from the list made under section 4(a)(1) must be based on the best scientific and commercial data available at the time of the determination, regardless of whether that information differs from the recovery plan.

In the course of implementing conservation actions for a species, new information is often gained that requires recovery efforts to be modified accordingly. There are many

paths to accomplishing recovery of a species, and recovery may be achieved without all criteria being fully met. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished, yet the Service may judge that, overall, the threats have been minimized sufficiently, and the species is robust enough, to reclassify the species from endangered to threatened or perhaps even delist the species. In other cases, recovery opportunities may have been recognized that were not known at the time the recovery plan was finalized. These opportunities may be used instead of methods identified in the recovery plan.

Likewise, information on the species may be learned that was not known at the time the recovery plan was finalized. The new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery of species is a dynamic process requiring adaptive management, planning, implementing, and evaluating the degree of recovery of a species that may, or may not, fully follow the guidance provided in a recovery plan.

The following discussion provides a review of recovery planning and implementation for the West Indian manatee, as well as an analysis of the recovery criteria and goals as they relate to evaluating the status of the species.

Recovery Actions

Recovery and conservation actions for the West Indian manatee are described in the “UNEP Caribbean Environment[al] Program’s Regional Management Plan for the West Indian Manatee” (UNEP 2010, entire) and in national conservation plans for

countries outside the United States. Within the United States, the Service's Recovery Plan for the Puerto Rico Population of the West Indian (Antillean) Manatee (USFWS 1986, entire), the South Florida Multi-Species Recovery Plan (USFWS 1999, entire), and the Florida Manatee Recovery Plan (USFWS 2001, entire) identify recovery and conservation actions for the species. Actions common to all plans include minimizing manatee mortality and injury, protecting manatee habitats, and monitoring manatee populations and habitat.

UNEP Caribbean Environment[al] Program's Regional Management Plan for the West Indian Manatee, National Conservation Plans (outside the United States)

The UNEP plan, published in 2010, identifies short- and long-term conservation and research measures that should be implemented to conserve the West Indian manatee. This plan also includes an overview of West Indian manatees within their range countries, including descriptions of regional and national conservation measures and research programs that have been implemented. Given the general lack of information about manatees in most range countries, the plan recommends that needed research and the development of common methodologies be prioritized in concert with coordinated manatee and manatee habitat protection efforts (UNEP 2010, entire).

Within the species' range, foundations for coordinated conservation and research activities are developing and a number of governments have designated manatee protection areas and have developed or are developing conservation plans (UNEP 2010, p. xiv). National legislation exists for manatees in all range countries, and many

countries have ratified their participation in international conventions and protocols that protect manatees and their habitat (UNEP 2010, p. xv). See Supplemental Documents 1 and 3 in Docket No. FWS–R4–ES–2015–0178. Belize, Colombia, Costa Rica, Guatemala, Mexico, the United States, Puerto Rico, and Trinidad have developed country-specific manatee recovery plans (UNEP 2010, p. 92).

Efforts to conserve manatees outside the United States vary significantly from country to country. Some countries, including but not limited to Mexico, Belize, Brazil, and Cuba, are engaged in efforts to assess current status and distribution of manatees. Many countries, including Belize and Brazil, provide protections for manatees and their habitat. For example, the manatee in Belize is listed as endangered under Belize’s Wildlife Protection Act of 1981. Belize protects manatees from overexploitation, and its recovery plan implements recovery actions similar to those identified in the Florida and Puerto Rico recovery plans. Efforts to protect manatees include education and outreach efforts, and countries are promoting cooperation and information exchanges through venues such as the recent Cartagena Convention meetings (UNEP 2014, entire). A successful cooperative initiative identified at the meetings includes the implementation of manatee bycatch surveys in the Dominican Republic, Belize, Colombia, and Mexico (Kiszka 2014, entire). We are encouraged by the progress that is being made in several portions of the Antillean manatee’s range in protecting this mammal and the growing enthusiasm behind implementing recovery to better protect this important species. In the future, we would like to support and reach out to these countries to assist them with their efforts to further conserve manatees.

Recovery Plan for the Puerto Rico Population of the West Indian (Antillean)

Manatee

We approved the Recovery Plan for the Puerto Rico population of the West Indian (Antillean) manatee on December 24, 1986 (USFWS 1986, entire). Although this plan is considered out of date (USFWS 2007, p. 26), we present the progress we have made under the identified tasks. The 1986 plan included three major objectives: (1) to identify, assess, and reduce human-related mortalities, especially those related to gill-net entanglement; (2) to identify and minimize alteration, degradation, and destruction of important manatee habitats; and (3) to develop criteria and biological information necessary to determine whether and when to reclassify (either delist or downlist) the Puerto Rico population (USFWS 1986, p. 12). The Recovery Plan also includes a step-down outline that identifies two primary recovery actions for: (1) population management and (2) habitat protection. Since the release of the 1986 Recovery Plan for the Puerto Rico population of the West Indian (Antillean) manatee, initiated recovery actions have provided substantial new knowledge about the species' ecology and threats. Some of these efforts apply to multiple tasks and are helping to update conservation information and tools that are applied towards adaptive management and education. Here we report on the current status of these actions.

Recovery Task (1): Population management. Recovery actions under this task include: (11) Reduce human-caused mortality, (12) determine manatee movement patterns and trends in abundance and distribution, (13) assess contaminant concentrations

in manatees, (15) determine quantitative recovery criteria, and (16) develop manatee protection plans for areas of specific importance.

Recovery Task (2): Habitat protection. Recovery actions under this task include: (11) Radio-tag manatees to determine habitat utilization, (12) determine and map distribution of seagrass beds and sources of fresh water, and (13) monitor important habitat components and ensure protection.

A carcass salvage program was first implemented in the late 1970s and continues today. Mignucci-Giannoni *et al.* (2000, p. 189) provided an analysis of stranding data and identified sources of human-caused mortality. This summarization of data points indicates a shift in the nature of threats since the release of the 1986 Recovery Plan, which listed poaching, direct capture, and entanglement as the most significant threats to manatees. Watercraft collision is now considered the greatest threat to manatees in Puerto Rican waters (Mignucci *et al.* 2000, p. 189; Drew *et al.* 2012, p. 26). Currently, carcass salvage efforts are led by the Puerto Rico Department of Natural and Environmental Resources (PRDNER) with support from the Puerto Rico Manatee Conservation Center (PRMCC) (the former Caribbean Stranding Network or CSN) and the Puerto Rico Zoo. There has not been a record of poaching since 1995 as a result of increased public awareness of the protected status of the manatee. The successful rehabilitation and release of the captive manatee “Moises” in 1994, a manatee calf stranded after the mother had been killed by poachers, served to incite a change of cultural values and increase awareness about threats to manatees (Marsh and Lefebvre 1994, p. 157).

Documented entanglement in fishing nets rarely occurs. However, in 2014, three adult manatees were entangled in large fishing nets; one of them was an adult female that died (PRDNER 2015, unpubl. data). Significant exposure was given to this case through the local and social media. Current PRDNER fishing regulations still allow the use of beach seine nets with certain prohibitions that need to be carefully monitored. Fisheries-related entanglements and debris ingestion are rarely documented but may occur and cause take of manatees. A recent instance was noticed in August 2014, where an adult female was confirmed to have both flippers severely entangled in monofilament line. Attempts to capture the female manatee from the shore were unsuccessful. This manatee has not been observed since that time. Agencies, community groups, and nongovernmental organizations in Puerto Rico consistently educate the public about proper waste disposal that can affect manatees.

In 2012, the Service completed a cooperative agreement with researchers from North Carolina State University (NCSU) to identify potential Manatee Protection Areas (MPAs) and address some of the core recommendations made by the most recent West Indian manatee 5-year review, such as the establishment of MPAs (USFWS 2007, p. 37). This collaboration led to the identification of several potential MPAs and serves to update the body of knowledge pertaining to key ecological resources used by manatees (i.e., seagrass, shelter, freshwater) and the current status of threats to the Antillean manatee (Drew *et al.* 2012, pp. 1, 33–34). MPAs serve to prevent the take of one or more manatees (USFWS 1979). The MPA selection criteria considered key manatee resources (i.e., seagrass, shelter, freshwater), manatee aerial surveys, and areas where take can be

minimized. After expert elicitation and a thorough literature review, available data were spatially analyzed and described to reflect manatee use and habitat preference.

Federal MPAs have not been designated in Puerto Rico, and the PRDNER does not have a specific manatee area regulation like the State of Florida's Manatee Sanctuary Act of 1978 (FMSA), which allows for management and enforcement of boat speed restrictions and operations in areas where manatees are concentrated. Still, the PRDNER has the authority to establish boat speed regulatory areas marked with buoys wherever deemed necessary. For example, in 2014, the USFWS, PRDNER, and Reefscaping, Inc. finalized the installation of 100 manatee speed regulatory buoys throughout known important manatee use areas, and the PRDNER has a plan to install more buoys. In addition, the Navigation and Aquatic Safety Law for the Commonwealth of Puerto Rico (Law 430) was implemented in 2000. This law restricts boat speeds to 5 miles per hour within 150 feet (45 meters) from the coastline unless otherwise posted. However, the effectiveness of this law and State manatee speed regulatory buoys have not been appropriately assessed, and enforcement is limited (see Factor D).

In Puerto Rico, island-wide manatee aerial surveys have been conducted since the late 1970s. These aerial surveys provide the basis for island-wide distribution patterns and to determine minimum population direct counts in some areas or throughout the island. Not all surveys were equal in terms of the area covered and time of year in which they were done. These direct counts identify a number of animals observed at the time of the survey and suggest that there are at least a specified number of manatees in the population. The Service recognizes that these counts do not accurately represent the total

number of manatees in the population. Weather, other environmental factors (*e.g.*, water clarity), observer bias, and aerial survey space restrictions influence count conditions and affect detection probability and final count, thus likely the true number of individuals is underestimated. Furthermore, as in the Florida manatee aerial surveys, survey methods preclude any analysis of precision and variability in the counts, and do not allow for the estimation of the apparent detection probability. In spite of the high variability between and within surveys, the data can be used to specify a minimum population direct count within a time period (one island-wide survey).

The most consistent surveys were conducted from 1984 to 2002 (USFWS Manatee Aerial Surveys 2015, unpubl. data). However, methods used provided only a direct count and did not allow for a more reliable estimate of population size with detection probabilities (Pollock *et al.* 2013, p. 2). Hence, estimates of population size are likely biased low, and inferences from trend analyses are unreliable. The Service again partnered with researchers from the NCSU to conduct a review of aerial survey protocols and implement a sampling protocol that allows the estimation of a detection probability (Pollock *et al.* 2013, pp. 2–4). In 2010, the Service partnered with Atkins (private consultant) to implement the new sampling protocol in order to provide for more reliable population estimates. A total of six aerial surveys were completed from 2010 to 2014 in order to test the new protocol and population estimate calculations. Data are still being reviewed, but results from the October 2010 survey derived an estimated average population size of 532 manatees in Puerto Rico, with a 95 percent equal area confidence interval of 342–802 manatees (Pollock *et al.* 2013, p. 8).

Recovery actions are also implemented during technical assistance and project review. Any action or project with a Federal nexus (*e.g.*, Federal funds, permits, or actions) will require a consultation with the Service under section 7 of the Act. During the consultation process, the Service identifies conservation measures to avoid and minimize possible effects of proposed actions or projects. We review numerous projects each year pertaining to the manatee, for example, dredging, dock and marina construction, coastal development, marine events (*i.e.*, high-speed boat races), and underwater and beach unexploded ordnance, among others. The Service has developed Antillean manatee conservation measures guidelines specific to Puerto Rico. For example, we have worked with the U.S. Coast Guard to develop and implement standard permit conditions for boat races, such as observer protocols.

South Florida Multi-Species Recovery Plan, West Indian Manatee

The South Florida Multi-Species Recovery Plan, West Indian Manatee element, was adopted on August 18, 1999, by the Service (USFWS 1999, entire). This ecosystem-based recovery plan is intended to recover listed species and to restore and maintain the biodiversity of native plants and animals in South Florida and is not intended to replace existing recovery plans but to enhance recovery efforts (USFWS 1999, p. 3). Inasmuch as manatees are a component of South Florida ecosystems, this plan included species information and recovery tasks from the then-current Florida manatee recovery plan, the Service's 1996 Florida Manatee Recovery Plan (USFWS 1996, entire). Because the 1996 Florida Manatee Recovery Plan was revised in 2001, the South Florida Multi-Species

Recovery Plan, West Indian Manatee element became obsolete. However, the 2001 Florida Manatee Recovery Plan includes tasks that address manatee conservation throughout this subspecies' range, including in South Florida.

Manatee recovery activities addressed in the south Florida region include a Comprehensive Everglades Restoration Plan (CERP) Task Force that addresses CERP tasks related to manatee conservation, an Interagency Task Force for Water Control Structures that minimizes manatee deaths associated with water control structures, and efforts to protect the manatees' south Florida winter habitat (FWC 2007, pp. 63, 196).

The CERP Task Force developed guidelines for manatee protection during CERP-related construction activities. The guidelines address culvert and water control structure installation, potential thermal effects of Aquifer Storage and Recovery wells, potential manatee entrapment in canal networks, and in-water construction effects. The Task Force evaluated proposed changes to existing canal systems and the construction of new structures planned for CERP implementation and recommended measures to minimize effects on manatees. The measures have been implemented and are in effect (FWC 2007, p. 196).

Water control structures are mostly found in south Florida and are a predominant means for controlling flooding in the region. Water control structures primarily include flood gates and navigation locks that allow vessel passage through dams and impoundments, such as those associated with Lake Okeechobee. Manatees travel through these structures and are occasionally killed in crushings and impingements. Manatee protection devices have been installed on most structures known to have killed

manatees, and the number of deaths has been reduced (FWC 2007, p. 63). For the period 1998–2008, the average annual number of structure-related deaths was 6.5 deaths. This number was reduced to 4.2 deaths per year from 2009–2014 (FWC 2007, pp. 194–195; FWC FWRI Manatee Carcass Salvage Database 2015, unpubl. data).

Important warm-water wintering sites for manatees in south Florida include power plant discharges, springs, and passive warm-water sites (sites characterized by warm-water inversions and other features). State and Federal rules have been adopted for all power plant discharges in south Florida that limit public access during the winter (FWC 2007, pp. 235–238; USFWS 2007, pp. 71–79). Coincidentally, a majority of the significant power plants used by wintering manatees have been repowered and have projected lifespans of about 40 years (Laist *et al.* 2013, p. 10). The loss of a passive warm-water site due to restoration activities, the Port of the Islands warm-water basin, is being addressed through the construction of an alternate warm-water site downstream of the original site (Dryden 2015, pers. comm.).

Florida Manatee Recovery Plan

We published the current Florida Manatee Recovery Plan on October 30, 2001 (USFWS 2001). This recovery plan includes four principal objectives: (1) Minimize causes of manatee disturbance, harassment, injury, and mortality; (2) determine and monitor the status of manatee populations; (3) protect, identify, evaluate, and monitor manatee habitats; and (4) facilitate manatee recovery through public awareness and education. To help achieve these objectives, the plan identifies 118 recovery

implementation tasks. Important tasks include those that address the reduction of watercraft collisions and the loss of warm-water habitat.

Recovery Objective 1. Minimize causes of manatee disturbance, harassment, injury, and mortality. Tasks identified under this objective include (1) Conducting reviews of permitted activities; (2) minimizing collisions between manatees and watercraft; (3) enforcing manatee protection regulations; (4) assessing and minimizing mortality caused by large vessels; (5) eliminating water control structure deaths; (6) minimizing fisheries and marine debris entanglements; (7) rescuing and rehabilitating distressed manatees; and (8) implementing strategies to minimize manatee harassment.

Task 1. Conduct reviews of permitted activities. The Service conducts reviews of coastal construction permit applications to minimize impacts to manatees and their habitat, reviews high-speed marine event permit applications to minimize the effect of concentrated, high-speed watercraft events on manatees, and reviews National Pollution Elimination Discharge Elimination System (NPDES) permits to insure that existing, significant discharges do not adversely affect manatees and insure that no new attractant discharges are created.

The State of Florida requires counties to develop manatee protection plans (MPPs). These are county-wide plans for the development of boat facilities (docks, piers, dry-storage areas, marinas, and boat ramps) that specify preferred locations for boat facility development based on an evaluation of natural resources, manatee protection needs, and recreation and economic demands. MPPs are reviewed by FWC and the Service and, when deemed adequate, are used to evaluate boat access projects. When

proposed projects are consistent with MPPs, permitting agencies authorize the construction of facilities in waters used by manatees. Currently, all of the original 13 counties required to have MPPs have plans, as well as Clay and Levy Counties. Flagler and Charlotte Counties are also preparing plans.

The Service developed programmatic consultation procedures and permit conditions for new and expanding watercraft facilities (*e.g.*, docks, boat ramps, and marinas) as well as for dredging and other in-water activities through an effect determination key with the U.S. Army Corps of Engineers and State of Florida (the “Manatee Key”) (recently revised in 2013). The Manatee Key ensures that watercraft facility locations are consistent with MPP boat facility siting criteria and are built consistent with MPP construction conditions. The Service concluded that these procedures constitute appropriate and responsible steps to avoid and minimize adverse effects to the species and contribute to recovery of the species.

The Service has worked with the U.S. Coast Guard and State agencies to develop and implement standard permit conditions for high-speed marine event permits. These conditions require that events take place at locations and times when few manatees can be found at event locations and require event observer programs. Observer programs place observers in locations in and around event sites; these observers watch for manatees and shut events down when manatees enter event sites.

The Florida Department of Environmental Protection (FDEP) issues and renews NPDES permits for power plants, desalination plants, wastewater treatment plants, and other dischargers that affect manatees. The FWC, the Service, and others review these

actions. These reviews insure that discharges identified as beneficial to manatees continue to operate in a way that does not adversely affect manatees and seek to modify or eliminate those discharges that adversely affect manatees. In particular, these reviews prevent the creation of new sources of warm water and drinking water, known manatee attractants.

Task 2. Minimize collisions between manatees and watercraft. See discussion of watercraft collisions under Factor E, below.

Ongoing efforts to minimize collisions between manatees and watercraft include the adoption of manatee protection areas that require boat operators to slow down or avoid sensitive manatee use areas. By requiring boats to slow down, manatees are better able to evade oncoming boats and boat operators are better able to see manatees and prevent collisions. Protected areas minimize the take of manatees in manatee wintering areas, resting areas, feeding areas, travel corridors, and other important manatee use sites. Manatee protection areas have been adopted in 26 Florida counties by the State of Florida, local communities, and the Service. Manatee protection areas were first adopted in the late 1970s, and additional areas continue to be adopted, as needed. For example, FWC recently adopted new protection areas in western Pinellas County (68C–22.016).

Task 3. Enforce manatee protection regulations. Service and State efforts to reduce the number of watercraft collisions with manatees rely on enforced, well-defined, and designated MPAs. Integral to these efforts are an adequate number of law enforcement officers to patrol and enforce these areas. Federal, State, and local law enforcement officers enforce these measures; Federal officers can enforce State

regulations, and State officers can enforce Federal regulations. Officers can only enforce areas that are properly marked by well-maintained signs and buoys. Maintenance of these markers requires significant, continuing funding to ensure the presence of enforceable protection areas.

It is difficult to ascertain the adequacy of enforcement efforts. Data concerning dedicated officer hours on the water and numbers of citations written are confounding. For example, many dedicated officer hours on the water address diverse missions, and it is not possible to identify how many of these hours are devoted to manatee enforcement and how many hours are dedicated to other missions. Boater compliance assessments provide another measure to assess adequacy. Boater compliance varies by waterway, with some waterways experiencing 85 percent compliance rates and others as little as 14 percent (Gorzelany 2013, p. 63). Average boater compliance throughout Florida is 54 percent (Shapiro 2001, p. iii). An enforcement presence generally ensures a higher compliance rate (Gorzelany 2013, p. 34).

Task 4. Eliminate water control structure deaths. As discussed below, entrapment and crushing in water control structures was first recognized as a threat to manatees in the 1970s (Odell and Reynolds 1979, entire), and measures were immediately implemented to address manatee mortality. While initial measures were mostly ineffective, recent advances in protection/detection technology have nearly eliminated this threat to Florida manatees. In 2014, the 5-year average for manatee deaths at structures and locks was 4.2 manatee deaths per year as opposed to 6.5 manatee deaths per year during the preceding 20 years (FWC FWRI Manatee Carcass Salvage

Database, 2015, unpubl. data).

Task 5. Minimize fisheries and marine debris entanglements. Fishing gear, including both gear in use and discarded gear (*i.e.*, crab traps and monofilament fishing line), are a continuing problem for manatees. To reduce this threat, a manatee rescue program disentangles manatees, derelict-crab-trap removal programs and monofilament recycling programs remove gear from the water, and extensive education and outreach efforts increase awareness and promote sound gear disposal activities. See Factor E for additional information. Because of continued and ongoing fishing into the foreseeable future, it is unlikely that this threat will be eliminated.

Task 6. Rescue and rehabilitate distressed manatees. Distressed manatees are rescued throughout the southeastern United States. Rescuers include the State of Florida, other range States, and numerous private organizations. Each year these rescuers assist dozens of manatees that present with a variety of stresses. Significant causes of distress include watercraft collisions, fishing gear entanglements, calf abandonment, and exposure to cold and brevetoxin. Many animals are treated and released in the field, and others with significant needs are taken to one of three critical care facilities for medical treatment. A majority of manatees rescued through this program are successfully released back into the wild (USFWS Captive Manatee Database, 2015, unpubl. data).

Task 7. Implement strategies to minimize manatee harassment. See discussion of harassment under Factor B, below.

Federal and State regulations prohibiting harm and harassment (including provisioning) are in effect and enforced (see Supplemental Document 2 in Docket No.

FWS–R4–ES–2015–0178). Extensive outreach efforts encourage proper viewing practices and include the efforts of the Service, tour guides, and others and include various outreach materials. In areas with large aggregations of manatees, the Service and FWC have designated manatee sanctuaries and no-entry areas where waterborne activities known to take manatees are prohibited. When commercial manatee viewing activities occur on National Wildlife Refuges, businesses are required to obtain permits that restrict their activities to prevent harassment from occurring.

Recovery Objective 2. Determine and monitor the status of manatee populations.

Tasks identified under this objective include: (1) Conducting status reviews; (2) determining life-history parameters, population structure, distribution patterns, and population trends; (3) evaluating and monitoring causes of mortality and injury; and (4) defining factors that affect health, well-being, physiology, and ecology. Research projects that support this objective include aerial surveys, a carcass salvage program, a photo-identification program, telemetry studies and others.

A USGS-led status and threats analysis for the Florida manatee was updated in 2015 (Runge *et al.* 2015, entire). This effort updates adult survival rates, considers the demographic effects of the major threats to Florida manatees, and evaluates how those demographic effects influence the risk of extinction using the manatee Core Biological Model. Adult survival rates were updated through winter 2008-2009 (See Table 3); observations during the winter of 2008-2009 were included in the data analysis, but 1-2 annual estimates at the end of the time series were dropped because of concerns about end of time series bias (Runge *et al.* 2015, p. 8). Although the adult survival rate is less

than one, in the Atlantic, Northwest, and Upper St. Johns regions, growth rates have been demonstrably greater than 1 (positive growth) over the recent past (1983–2007). In the Southwest, the growth rate has been greater than 1, but if the severe red-tide frequency increases, the growth rate could stabilize or begin to decline (Runge *et al.* 2015, p. 7). Although the new rates are higher, there is no evidence of a positive trend between the current analysis and the previous rates identified in the 2007 5-year review (Runge *et al.* 2015, 19; USFWS 2007, p. 65).

TABLE 3.—Updated Florida manatee adult survival rates (Runge *et al.* 2015, p. 7).

Region	Mean	Standard Error	Period
Atlantic	0.967	0.004	1983–2007
Upper St. John’s	0.975	0.004	1986–2006
Northwest	0.977	0.004	1983–2007
Southwest	0.971	0.004	1996–2007

The analysis forecast the manatee population under different threat scenarios using the Manatee Core Biological Model. Data from the Manatee Carcass Salvage Program, 2001–2009 (FWC FWRI Manatee Carcass Salvage Program 2015, unpub. data) were used to estimate fractions of mortality due to each of six known threats: watercraft, water control structures, marine debris, cold, red tide, and others (Runge *et al.* 2015, p. 4).

The model expressed the contribution of each threat as it affects manatee persistence, by removing them, one at a time, and comparing the results to the “status quo” scenario. The “status quo” represents the population status in the continued presence of *all* of the threats, including the threat of the potential loss of warm water in

the future due to power plant closures and the loss of springs and/or reduction in spring flows.

The threats due to watercraft, water-control structures, and entanglement were each “removed” by reducing the regional mortality of adults and calves by the estimated fractions of mortality. The threat due to loss of warm water was removed by assuming that the winter warm-water capacity for manatees will remain at current levels for the indefinite future. The threat of red tide was removed by setting the probability of occurrence of a *major* red tide event to zero; low background levels of red tide mortality that occurs each year were already incorporated into the baseline. The various scenarios were considered as “all or nothing;” either a particular threat was present at its current level (and remained at that level indefinitely), or it was removed completely. Thus, this comparison provides a measure of the relative effect of each threat on the status of the Florida manatee population.

Under the *status quo* scenario, the statewide manatee population is expected to increase slowly, nearly doubling over 50 years, and then stabilize as the population reaches statewide carrying capacity. Under this scenario, the model predicts that it is unlikely (< 2.5 percent chance) that the statewide population will fall below 4,000 total individuals over the next 100 years, assuming current threats remain constant indefinitely (Runge *et al.* 2015, p. 13).

Results for each threat scenario (status quo, plus removal of each of the five threats, one at a time) were evaluated over different timeframes and for different levels of effective population size (or its surrogate, adult population size) (Runge *et al.* 2015, p. 5).

This analysis was conducted for two “coastal” regions of Florida—an East Coast (Upper St. Johns River and Atlantic Coast) Region and a Gulf Coast (Northwest and Southwest) Region. On the Gulf Coast there is a very low probability (0.24 percent) that the effective population size could fall below 500 animals under the status quo scenario (Runge *et al.* 2015, p. 14). The major threats here are watercraft-related mortality, loss of warm water, and red tide. On the East Coast, the probability that the effective population size would fall below 500 animals is 0.68 percent (Runge *et al.* 2015, p. 16). Watercraft-related mortality is the major threat to this population. The probability that the effective population size will fall below 500 animals on either coast within 150 years under the status quo scenario is 0.92 percent (Runge *et al.* 2015, p. 16).

Recovery Objective 3. Protect, identify, evaluate, and monitor manatee habitats.

Tasks identified under this objective include: (1) Protecting, identifying, evaluating, and monitoring existing natural and industrial warm-water refuges and investigate alternatives; (2) establishing, acquiring, managing, and monitoring regional protected-area networks and manatee habitat; (3) ensuring that minimum flows and levels are established for surface waters to protect resources of importance to manatees; and (4) assessing the need to revise critical habitat. Important habitats for the Florida manatee include winter sources of warm water, forage, drinking water, travel (or migratory) corridors, and sheltered areas for resting and calving. The most significant of these include winter warm water and winter foraging areas. Florida manatees are at the northern limit of the species’ range and require stable, long-term sources of warm water during cold weather and adjacent forage to persist through winter periods. Historically,

manatees relied on the warm, temperate waters of south Florida and on natural warm-water springs scattered throughout their range as buffers to the lethal effects of cold winter temperatures. Absent warm water, prolonged exposure to cold water temperatures results in debilitation and/or death due to “cold stress syndrome” (Bossart *et al.* 2004, p. 435; Rommel *et al.* 2002, p. 4). Several spots in this recovery effort summary (like in Objective 1 above) show efforts that we are taking to protect these sites and continue to implement recovery for the West Indian manatee.

Recovery Objective 4. Facilitate manatee recovery through public awareness and education. Tasks include: (1) Developing, evaluating, and updating public education and outreach programs and materials; (2) coordinating the development of manatee awareness programs and materials to support recovery; and (3) developing consistent manatee viewing and approach guidelines, utilizing the rescue, rehabilitation, and release program to educate the public.

Manatee conservation relies on significant education and outreach efforts. While the Service and State of Florida engage in these efforts, many diverse stakeholders also participate in these activities. Counties, municipalities, boating organizations, manatee advocacy groups, environmental organizations, and others produce and distribute outreach materials through a variety of media. An active manatee rescue and rehabilitation program displays rehabilitating manatees and promotes conservation through display and educational programs.

Significant education and outreach efforts include Crystal River National Wildlife Refuge’s (NWR) manatee kiosks, located at all water access facilities in Kings Bay,

Florida, and adjoining waters. The kiosk panels provide the public with information about manatees and guidance addressing manatee viewing activities. The kiosks are supported by Refuge-linked web media that provide additional information about manatee harassment and user activities (Vicente 2015, pers. comm.). SeaWorld Orlando, through its permitted display of rehabilitating manatees, reaches out to unprecedented numbers of visitors. The display addresses the park's rescue and rehabilitation program and informs the public about threats to manatees and what they can do to reduce the number of manatees affected by human activities (SeaWorld Parks and Entertainment, 2015. See: <http://seaworld.org/en/animal-info/animal-infobooks/manatee/>.)

Recovery Plan for the Puerto Rican population of the West Indian (*Antillean manatee*) (USFWS 1986, entire)

The 1986 Recovery Plan does not establish quantitative recovery criteria to describe a sustainable population of manatees in Puerto Rico. It does, however, direct the Service to determine and satisfy the recovery criteria that are based on mortality and abundance trends and a minimum population size and ensure that adequate habitat protection and anti-poaching measures are implemented (USFWS 1986, Executive Summary). The Recovery Plan also specifies that delisting should occur when the population is large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural changes and stochastic or catastrophic events. As previously explained, the Service has made substantial progress implementing a number of recovery actions, and some other actions are in progress.

In the absence of historic data (previous to the late 1970s) that identifies a clear goal for population size, and population parameters such as adult survival rates, which have the highest potential effect on growth rate (Marsh *et al.* 2011, p. 255), it is not possible to stipulate with precision the population size and vital rates that should characterize a recovered, self-sustaining population of manatees in Puerto Rico. Hunter *et al.* (2012, p. 1631) describes low genetic diversity for the Puerto Rico population of Antillean manatees, and cites other authors that suggest at least 50 genetically effective breeders (~500 individuals) are needed to prevent inbreeding depression for short-term population survival, while other researchers suggest population levels in the upper hundreds to thousands to maintain evolutionary potential. The average estimate of 532 for the manatee population in Puerto Rico, ranging from a minimum of 342 to a maximum of 802 individuals (Pollock *et al.* 2013, p. 8), is just within the numbers of a viable population mentioned by Hunter *et al.* (2012, p. 1631). The Service still considers the Puerto Rico Antillean manatee population as stable, as it did in the previous status assessment (USFWS 2007, p. 33). Past and current aerial surveys have also served to demonstrate the island-wide distribution of the Puerto Rico population, which also does not seem to have changed. In the 45 years that have passed since the species was listed, it can be said that, according to the population numbers and maintenance of the population's island-wide distribution, the Puerto Rico manatee population is well represented and has shown resilient attributes for long-term persistence in spite of past and present natural and anthropogenic threats.

Major tasks for recovery include reduction of human-caused mortality, habitat protection, identification and control of any contaminant problems, and research into manatee behavior and requirements to direct future management (USFWS 1986, Executive Summary). The Service has already identified important manatee habitat and will continue to use and pursue new strategies towards manatee habitat protection together with the PRDNER. Planned research in the near future will focus on manatee health assessment to gain baseline information into potential contaminant problems and disease.

Florida Manatee Recovery Plan

The Florida Manatee Recovery Plan (USFWS 2001, entire) identifies criteria for downlisting the Florida subspecies from endangered to threatened and criteria for removing the subspecies from the List of Endangered and Threatened Wildlife. Both downlisting and delisting criteria include Listing/Recovery Factor criteria and demographic criteria. Criteria can be found in Supplemental Document 1 in Docket No. FWS–R4–ES–2015–0178.

A 2004 review of the demographic criteria noted that these criteria are largely redundant and that (1) no population can grow at a fixed rate indefinitely as limiting resources will eventually prevent the population from continuing to grow at that rate and the population will ultimately reach stability; (2) the reproductive criterion is difficult to estimate and the modeling results are difficult to interpret; and (3) demographic recovery criteria should be linked to statistically rigorous field data, as well as to the specific

population models that are intended for their evaluation. See previous review of demographic data in *Florida Manatee Recovery Plan* Objective 3.

Downlisting Criteria, Listing/Recovery Criterion A

1. Identify minimum flow levels for important springs used by wintering manatees.

Minimum spring discharge rates that consider estimated flow rates necessary to protect water supply and support overwintering manatees have been identified for some springs used by manatees. Minimum flows were established at Blue Spring, Fanning Spring, Manatee Spring, the Weeki Wachee River system and Weeki Wachee Springs, Homosassa Springs, and Chassahowitzka Spring. Florida water management districts have scheduled, or are in the process of scheduling, minimum flow requirements for the remaining springs. See Table 4. These regulations will ensure that adequate flows are met to support manatees. To date, minimum flows have been adopted for six springs, and efforts are under way to develop flows for two additional springs, including the Crystal River springs complex. The status of efforts to establish minimum flows for eight remaining springs are unknown.

TABLE 4.—Projected timeframes for establishing spring minimum flows (from water management districts).

Spring	Adopted/ Year Proposed for Adoption	Notes
EAST COAST, FLORIDA		
<i>Upper St. Johns River Region</i>		
Blue Spring (Volusia County)	ADOPTED	

Silver Glen Springs (Marion County)	UNKNOWN	To be initiated in 2016.
DeLeon Springs (Volusia County)	UNKNOWN	Initiated in 2014.
Salt Springs (Marion County)	UNKNOWN	
Silver Springs (Marion County)*	UNKNOWN	
<i>Atlantic Region</i>		
No springs.	N/A	
WEST COAST, FLORIDA		
<i>Northwest Region</i>		
Crystal River System and Kings Bay Springs (Citrus County)	2017	
Homosassa River Springs (Citrus County)	ADOPTED	Revision due 2019
Weeki Wachee/Mud/Jenkins Creek Springs (Hernando County)	ADOPTED	
Manatee/Fanning Springs (Dixie County)	ADOPTED	
Wakulla/St. Mark's Complex (Wakulla County)	2021	
Ichetucknee Springs Group (Columbia County)	UNKNOWN	Initiated in 2013.
Chassahowitzka River Springs (Citrus County)	ADOPTED	Revision due 2019
Rainbow Spring (Marion County)*	UNKNOWN	
<i>Southwest Region</i>		
Warm Mineral Springs (Sarasota County)	UNKNOWN	
Spring Bayou/Tarpon Springs (Pasco County)	UNKNOWN	
Sulphur Springs (Hillsborough County)	ADOPTED	

*At present, largely inaccessible to manatees.

2. *Protect a network of warm-water refuges as manatee sanctuaries, refuges, or safe havens.*

A network of warm-water sanctuaries/no-entry areas and refuges exists throughout much of the Florida manatee's range. Along the Atlantic Coast, all four of the primary power plant discharges have been designated as manatee protection areas and many lesser warm-water sites, such as the Coral Gables Waterway, are protected as well. In the St. Johns River region, Blue Springs is in public ownership, and the spring and run are protected. The four primary west Florida power plants are designated as

sanctuaries/no-entry areas, and significant warm-water springs in Citrus County are designated as sanctuaries. Efforts are ongoing to improve conditions and management of southwest Florida's Warm Mineral Springs. See Supplemental Document 2 in Docket No. FWS-R4-ES-2015-0178.

3. Identify foraging sites associated with the network of warm-water sites for protection (addressed below).

4. Identify for protection a network of migratory corridors, feeding areas, and calving and nursing areas.

Extensive research, including aerial surveys and field studies of tagged manatees, has identified many of the foraging sites associated with the Florida manatee's warm-water network, as well as migratory corridors, resting areas, and calving and nursery areas. In many of these areas, manatee protection area measures are in place to protect manatees from watercraft collisions. State and Federal laws afford some protection against habitat loss in these areas (see Factor D discussion below). For example, the Clean Water Act insures that discharges into waterways used by manatees are not detrimental to grass beds and other habitat features used by manatees.

Downlisting Criteria, Listing/Recovery Criterion B

1. Address harassment at wintering and other sites to achieve compliance with the Marine Mammal Protection Act (MMPA) and the Act and as a conservation benefit to the species.

To address harassment at wintering and other sites, the Service and State have designated manatee sanctuaries and no-entry areas to keep people out of sensitive wintering sites. Federal, State, and local law enforcement officers enforce these restrictions and address any violations that occur outside of the protected areas.

Kings Bay, located in Crystal River, Florida, is a world-renowned destination for manatee viewing activities. Commercial viewing activities began in the early 1970s, and today's activities generate millions in income to the region. Harassment associated with this activity has been addressed through the purchase of properties of sensitive manatee habitat, the designation of manatee sanctuaries and protected areas, the creation and operation of the Crystal River NWR in 1983, extensive outreach activities, and enforcement of regulations prohibiting manatee harassment. The Service adopted the Kings Bay Manatee Refuge rule in 2012 to expand existing sanctuary boundaries, better address manatee harassment occurring off refuge property, and minimize watercraft-related deaths in Kings Bay. The rule identifies specific prohibitions that can be enforced through the issuance of citations (USFWS 2012). Crystal River NWR recently adopted measures to help prevent any harassment in Three Sisters Springs and is considering further measures as the situation requires.

Downlisting criteria, Listing/Recovery Criterion C

At the time the recovery plan was developed, there was no data indicating that this was a limiting factor, thus no reclassification (downlisting) criteria was deemed necessary, therefore, no delisting criteria were established.

Downlisting criteria, Listing/Recovery Criterion D

Specific actions are needed to ensure the adequacy of existing regulatory mechanisms.

1. Establish minimum flows consistent with Listing/Recovery Criterion A.

See discussion under Listing/Recovery Criterion A, above.

2. Protect important manatee habitats.

Important manatee habitats have been identified and protected through a variety of means. Manatee habitat is protected through land acquisition and various Federal and State laws. Important acquisitions include Blue Spring in Volusia County and the Main Spring, Three Sisters Springs, and Homosassa Springs in Citrus County. Land managers for these sites manage habitat to benefit manatees. To insure that these habitats and habitat in public waterways are protected, regulatory agencies such as the Army Corps of Engineers, the Florida Department of Environmental Protection (FDEP), State water management districts, and others review permit applications for activities that could adversely modify or destroy habitat and require permittees to avoid or minimize impacts. Discharges and runoff that could affect habitat are addressed through the Clean Water Act's NPDES permitting program, administered by FDEP with oversight from the EPA.

3. Reduce or remove unauthorized take.

To address harassment at wintering and other sites, the Service and State have designated manatee sanctuaries and no-entry areas to keep people out of sensitive

wintering sites. Federal, State, and local law enforcement officers enforce these restrictions and address any violations that occur outside of the protected areas.

Downlisting Criteria, Listing/Recovery Criterion E

1. Create and enforce manatee safe havens and/or Federal manatee refuges.

To date, the Service and State have created more than 50 manatee protection areas, and protection area measures are enforced by the Service, U.S. Coast Guard, FWC, and local law enforcement officers.

2. Retrofit one half of all water control structures with devices to prevent manatee mortality.

Water control structures are flood gates that control water movement and navigation locks that allow vessel passages through dams and impoundments, such as those associated with Lake Okeechobee. Manatees travel through these structures and are occasionally killed when structures are closed or opened. Manatee protection devices installed on these structures prevent manatee deaths. See discussion in “South Florida Multi-Species Recovery Plan, West Indian Manatee.”

To date, all but one water control structure has been retrofitted with manatee protection devices. Efforts are ongoing to complete installation at the remaining site. This action has significantly reduced the impacts of control structure related manatee injury and death; such injuries or deaths are now relatively rare.

3. Draft guidelines to reduce or remove threats of injury or mortality from fishery entanglements and entrapment in storm water pipes and structures.

Some measures have been developed to reduce or remove threats of injury or mortality from fishery entanglements, and steps are being taken to minimize entrapments in storm water pipes and structures. Measures to address fishery entanglements include monofilament recycling programs and derelict crab trap removals; these two programs address primary sources of manatee entanglement. Storm water pipes and structures large enough for manatees to enter are designed to include features that prohibit manatee access. Existing structures are re-fitted with bars or grates to keep manatees out. In the event of entanglements or entrapments, the manatee rescue program intervenes. There are very few serious injuries or deaths each year due to these causes. Guidelines to minimize gear-related entanglements associated with netting activities have been developed. Similarly, guidance has been developed to reduce entrapment in storm water pipes and structures. See Factor E for additional information.

Remaining tasks needed to recover Florida manatees include:

- Continue to address pending changes in the manatees' warm-water network (develop and implement strategies).
- Support the adoption of minimum flow regulations for remaining important springs used by manatees.
- Protect and maintain important manatee habitat.
- Continue to maintain, adopt, and enforce manatee protection areas as appropriate (continue to fund law enforcement activities and manatee protection area marker maintenance).
- Continue to address instances of manatee harassment.

- Continue to review and address warm- and freshwater discharges and boat facility projects that affect manatees.
- Maintain and install manatee protection devices on existing and new water-control structures.
- Continue manatee rescue and rehabilitation efforts, including efforts to minimize the effect of manatee entanglements and entrapments.
- Continue to monitor manatee population status and trends.
- Continue manatee education and outreach efforts.

The Florida manatee population, estimated at about 6,350 manatees, is characterized by good adult survival rate estimates and positive breeding rates. The recently updated threats analysis continues to identify losses due to watercraft and projected losses of winter warm-water habitat as the greatest threats to this subspecies. The designation, marking, and enforcement of manatee protection areas in areas where manatees are at risk of watercraft collision, in addition to outreach efforts focused on minimizing this threat, addresses this concern. Numerous efforts have been made and are ongoing to protect and enhance natural warm-water sites used by wintering manatees. Addressing the pending loss of warm water habitat from power plant discharges remains a priority activity needed to achieve recovery.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing, reclassifying, or removing a species from the Federal Lists of Endangered and Threatened Wildlife and Plants.

A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We must consider these same five factors in reclassifying or delisting a species.

The following analysis examines all five factors currently affecting or that are likely to affect the West Indian manatee.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range.

West Indian manatees are found in coastal and riverine systems from the southeastern United States to northeastern Brazil, including freshwater, brackish, and marine habitats. Submerged, emergent, and floating vegetation is their preferred food. Important habitat components include foraging areas, freshwater sources, travel corridors, sheltered areas, and, in the southeastern United States, sources of warm water for wintering. Degradation and loss of manatee habitat occurs throughout (UNEP 2010, p. 12). Although the immediacy and the magnitude of this factor varies throughout the

species' range, available manatee foraging habitat does not seem to be a limiting factor in most of the range countries, including Florida and Puerto Rico (Orth *et al.* 2006, p. 994; Drew *et al.* 2012, p. 13; Lefebvre *et al.* 2001, entire; UNEP 2010, entire). Still, manatee habitat degradation and loss remains a threat in most countries, and ongoing efforts to address these threats remains a recovery priority (Castelblanco *et al.* 2012, p. 142).

Some countries have been able to document manatee habitat loss effects, while other countries do not have site-specific information available to quantify the severity and/or frequency of this threat on manatees. For example, in Mexico, loss of manatees from certain areas has been attributed to, among other factors, the construction of a dam along a river (Colmenero-Rolón and Hoz-Zavala 1986, in UNEP 2010, p. 59), while significant manatee habitat modification has affected the number of animals along the coast of Veracruz (Serrano *et al.* 2007, p. 109). Other important manatee habitat in Belize such as Turneffe atoll is also affected by unsustainable fishing, mangrove clearing, overdevelopment, and dredging (Edwards 2012, p. 72).

In Honduras, manatee abundance declined, in part, because of habitat degradation (Cerrato 1993, in Lefebvre *et al.* 2001, p. 440), while in Costa Rica, habitat modification activities such as logging and agriculture have increased sedimentation in rivers and lagoons, making it difficult for manatees to access suitable habitat in the Tortuguero River system (Smethurst and Nietschmann 1999, in Lefebvre *et al.* 2001, p. 442). In Panama, manatee distribution is apparently fragmented by discontinuous and likely depleted habitat (Lefebvre *et al.* 2001, p. 442).

Although threats continue, there are positive recovery efforts being made for the West Indian manatee to protect against threats posed by habitat loss or modification in many range countries and in the areas of U.S. jurisdiction. In Belize, three protected areas were created specifically to protect critical manatee habitat, and more than 43 percent of the country's protected areas are within the coastal zone (UNEP 2010, p. 24). Mexico has designated significant special manatee protection areas (UNEP 2010, p. 60), and Trinidad protected the Nariva Swamp, the most important manatee habitat in that country (UNEP 2010, p. 77). Although most countries within the species' range outside the United States continue to provide suitable manatee habitat, habitat degradation and loss remains a threat requiring ongoing recovery efforts.

In Puerto Rico and the southeastern United States, threats to manatee habitat are well documented. The Service's 2007 5-year review identified specific threats including: Loss of seagrass due to marine construction activities (extent unknown), propeller scarring and anchoring (magnitude unknown), and oil spills; loss of freshwater due to damming and competing uses; and increasing coastal commercial and recreational activities (USFWS 2007, pp. 30–31). Human activities that result in the loss of seagrass include dredging, fishing, anchoring, eutrophication, siltation, and coastal development (Duarte 2002, p. 194; Orth *et al.* 2006, p. 991; PRDNER 2008, entire; PRDNER 2012, entire).

In the Service's 2007 5-year review, overall impacts to manatee habitat had not been quantitatively assessed in Puerto Rico. At that time, the Service did not believe there were significant threats to seagrass habitat and noted that the potential loss of fresh

water sources may be the most limiting of the manatee habitat variables in the future. However, the 5-year review identified other habitat threats as identified in the previous paragraph. All of these threats still remain, in varying degrees and immediacy. For example, oil spills may always be considered a non-imminent threat to the manatee and its habitat. The Service forms part of the Caribbean Regional Response Team, who are responsible for preparedness activities including planning, training, and exercising to ensure an effective response to releases of hazardous substances and oil spills. The Service developed a manatee specific response plan as part of the Puerto Rico and USVI Area Contingency Plan (<http://ocean.floridamarine.org/ACP/SJACP/Documents.html>), including a manatee specific response plan.

Since the 2007 5-year review, habitat effects including threats to seagrass habitat have been quantitatively assessed. The PRDNER has been gathering new relevant information documented in its two reports entitled *Evaluation of Recreational Boating Anchor Damage on Coral Reefs and Seagrass Beds* (PRDNER 2008, entire; PRDNER 2012, entire). The report identified the east, south, and west coasts of the island as the areas with major impacts on seagrass beds caused by vessel propellers, indiscriminate anchorage, and poor navigation skills. According to the reports, the areas with major impacts of severe magnitude were those on the south-central coast, including high manatee use areas in the municipalities of Guayama, Salinas and Guayanilla, among others. The PRDNER (2008, 2012, p. 6) also describes that seagrasses are being severely impacted by both the scarring actions of motor boat propellers and the scouring action of jet ski traffic in shallow waters. In addition, small to mid-size boat owners prefer to visit

near-shore areas, which have contributed to the decrease in seagrass density and an increment in the fragmentation of this habitat (PRDNER 2008, 2012, p. 7).

Although anthropogenic activities that result in the loss of seagrass such as dredging, anchoring, effects from coastal development, propeller scarring, boat groundings, and inappropriate recreational activities occur in Puerto Rico, seagrass abundance is not considered a limiting factor for the current Antillean manatee population of the Island (Drew *et al.* 2012, p. 13). It would be expected that a significant decrease of this resource could cause stress to the manatee population. However, no data is available to support estimates of how much seagrass is needed to sustain a larger manatee population (Bonde *et al.* 2004, p. 258). Based on the present availability of seagrass habitat in Puerto Rico, the Service believes the severity of the threat of degraded and or decreased seagrass habitat is low.

To offset these threats in Puerto Rico, a wide range of conservation efforts are ongoing (see **Recovery** discussion above). These include the collective efforts of the Service, the U.S. Army Corps of Engineers, PRDNER, the National Oceanic and Atmospheric Administration (NOAA), the U.S. Coast Guard, and others working to avoid, minimize, and mitigate project impacts on manatee habitat. The development and implementation of no-wake areas, marked navigation channels, boat exclusion areas, and standardized construction conditions for marinas and boat ramps are a few of the efforts making a positive impact on maintaining and protecting important manatee habitat (see **Recovery** sections).

Manatees require sources of fresh water for daily drinking and do not appear to exhibit a preference for natural over anthropogenic freshwater resources (Slone *et al.* 2006, p. 3). Sources of freshwater are currently not considered limiting in Puerto Rico and include the mouths of streams and rivers, coastal groundwater springs, and even industrial wastewater outflows (*e.g.*, wastewater treatment plants, hydroelectric power plants). At this time, the lack and/or degradation of fresh water is considered a low-level threat in Puerto Rico. There is no indication that manatees are being affected by a lack of freshwater sources, even during the 2015 severe drought and especially since it is possible for manatees to drink from several sources. On the other hand, the potential impact of poor water quality on the manatee population is unknown. In the same way as for other habitat threats, the Service will continue to assess and work with others towards maintenance and potential enhancement of manatee freshwater drinking sources.

Within the southeastern United States, the potential loss of warm water at power plants and natural, warm-water springs used by wintering manatees is identified as a significant threat (USFWS 2007, entire; Laist and Reynolds 2005 a, b, entire, and (USFWS 2001, entire). Natural springs are threatened by potential reductions in flow and water quality (due to unsustainable water withdrawals combined with severe droughts) and by factors such as siltation, disturbance caused by recreational activities, and others that affect manatee access and use of the springs (Florida Springs Task Force 2000, p. 13). Power plants, which provide winter refuges for a majority of the Florida manatee population, are not permanent reliable sources of warm water. In the past, some industrial sources of warm water have been eliminated due to plant obsolescence,

environmental permitting requirements, economic pressures, and other factors (USFWS 2000, entire). Experience with disruptions at some sites has shown that some manatees can adapt to minor changes at these sites; during temporary power plant shutdowns, manatees have been observed to use less preferred nearby sites. In other cases, manatees have died when thermal discharges have been eliminated due to behavioral persistence or site fidelity (USFWS 2000, entire).

The current network of power plant sites will likely endure for another 40 years or so (Laist *et al.* 2013, p. 9). We do not know for sure if the plants will be replaced or eliminated at the end of this time, but the likelihood is that the power plants will close (Laist and Reynolds 2005b, p. 281). We also do not know exactly how manatees would respond if some sites are lost, since past modifications or changes to power plant sites have resulted in variable response from manatees. If power plant outflows are lost, manatees would rely on remaining springs in the upper St. Johns River and northwest Florida regions and on Warm Mineral Springs in southwest Florida, passive thermal basins, and warm ambient waters in southernmost Florida. The loss of certain warm-water sites potentially could cause a change in Atlantic coast abundance and distribution because there are no natural springs on the Atlantic coast north of the St. John's River (Laist and Reynolds 2005b, p. 287).

Florida's springs have seen drastic declines in flows and water quality and many springs have been altered (dammed, silted in, and otherwise obstructed) to the point that they are no longer accessible to manatees (Taylor 2006, pp. 5–6; Laist and Reynolds 2005b, p. 287; Florida Springs Task Force 2001, p. 4). Flow declines are largely

attributable to demands on aquifers (spring recharge areas) for potable water used for drinking, irrigation, and other uses (Marella 2014, pp. 1–2). Declining flows provide less usable water for wintering manatees. Declines in water quality (*e.g.*, increased nitrates) can promote the growth of undesirable alga, such as *Lyngbya* sp., which can cover and smother food plants used by wintering manatees (Florida Springs Task Force 2001, pp. 12, 26). Notable springs largely inaccessible to manatees due to damming include springs in the Ocklawaha and Withlacoochee river systems. Springs that have silted in include Manatee and Fanning springs, Warm Mineral Spring, Weeki Wachee Spring, and others (Taylor 2006, pp. 5, 8).

In the case of Manatee, Fanning, and Weeki Wachee springs, restoration efforts have removed sand bars and other obstructions, making these sites once again accessible to manatees (The Nature Conservancy 2015). See: <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/florida/howwework/saving-manatees-through-springs-restoration.xml>. Also, Marella (2014, p. 1) noted declining demands on central Florida aquifers due to increased rainfall, declining agricultural demands, use of re-use water, and other water conservation measures, suggesting that spring flows used by manatees can be maintained. Chapter 62-42, Florida Administrative Code, requires that minimum flow levels be set for Florida waterbodies. Set flow levels require that measures be taken should flows drop below statutorily adopted levels, thus insuring adequate flows. Minimum flows have been set for six springs that are important to wintering manatees. Flow levels must be identified for the Crystal River springs complex and other important springs.

In the southeastern United States, a wide range of conservation efforts identified in the 2007 5-year Review are continuing (USFWS 2007, pp. 17–18; see also **Recovery** discussion above). Service efforts in cooperation and coordination with State and industry partners are ongoing to minimize any future manatee losses from industrial site reductions or closures by seeking short-term alternatives and long-term sustainable options for supporting manatees without the reliance on industrial warm-water sources. Spring studies and on-the-ground restorations seek to restore flows and access to existing natural springs. Habitat degradation and loss from natural and human-related causes are being addressed through collective efforts to improve overall water quality, minimize construction-related impacts, and minimize loss of seagrass due to prop scarring. Efforts to replant areas devoid of seagrass are showing success in restoring lost manatee foraging habitat.

Summary: Based on the wide extent and combined threats discussed above, the Service considers activities identified under Factor A to be a moderate threat to the species. While there have been substantial improvements towards addressing habitat threats since listing, these activities still threaten the West Indian manatee but not to the magnitude that places the species in danger of extinction, especially given the availability of suitable habitat throughout the species' range. If this downlisting rule is finalized, we will continue to evaluate projects with a Federal nexus in areas of U.S. jurisdiction (Puerto Rico and areas of the continental United States) to benefit habitat for the West Indian manatee and make recommendations to avoid and minimize impacts to manatee

habitat. For West Indian manatees in the continental United States, ensuring the continued availability of warm-water refugia sites is a critical need related to this factor.

We describe above (and in supplemental documents) progress with local, county, city, and State partners to maintain minimum flows and restore habitat at sites where we believe it will help address this habitat need for the species. For areas outside U.S. jurisdiction, we have documented examples of habitat destruction, modification, and fragmentation that have impacted West Indian manatees, by damming rivers and destroying estuaries. There are also a number of positive examples of manatee protection areas that will continue to provide long-term suitable manatee habitat. The Service, in coordination with its International Affairs Program, will continue to enhance international relations in order to promote, and work together with other countries towards, manatee habitat conservation.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.

Throughout the range of the species, manatees are used for a variety of purposes. Outside the United States, manatees have been hunted and are poached to supply meat and other commodities. Recreationally, people seek out opportunities to view manatees through commercial ecotour operators or on their own. There are numerous scientific studies being conducted of captive and wild manatees, including studies of specimens salvaged from carcasses. The public is educated about manatees through a variety of media, such as videos and photographs, including rehabilitating manatees in captivity.

Poaching remains a major threat to the manatee population outside of the southeastern United States (Marsh *et al.* 2011, p. 265) and has been responsible for past declining numbers throughout much of the Antillean subspecies' range (Thornback and Jenkins 1982, in Lefebvre *et al.* 2001, p. 426) (in 17 of 20 range countries). For example, in Guadeloupe (French Antilles), the local manatee population was hunted to extinction by the early 1900s (Marsh *et al.* 2011, p. 429). In Honduras, manatees are still actively poached on an opportunistic basis in La Mosquita (González-Socoloske *et al.* 2011, p. 129). Manatee meat is a highly prized source of protein in some local markets in Central America, bringing up to \$100 per pound (Jiménez 2002, Quintana-Rizzo 1993; in UNEP 2010, p. 12). Depending on certain social and economic factors, current poaching rates in northern Nicaragua vary from year to year (Self-Sullivan and Mignucci-Giannoni 2012, p. 44). Other manatee products include oil, bones, and hide (Lefebvre *et al.* 2001, p. 426; Marsh *et al.* 2011, p. 264; Self-Sullivan and Mignucci-Giannoni 2012, pp. 42–45).

Manatees are particularly susceptible to overexploitation because of their low reproductive rates (Lefebvre *et al.* 2001, p. 12). Accordingly, poaching poses a serious threat to some manatee populations, especially in those areas where few manatees remain. Currently, poaching is hypothesized no longer to occur in a few regions, has been reduced in others, and is still common in others (UNEP 2010, entire; Marsh *et al.* 2011, p. 386). For example, although manatee poaching in Colombia still occurs in specific areas and seasons (Castelblanco-Martínez 2009, p. 239), it is much less common today than in the past (UNEP 2010, p. 30). It is also no longer believed to be a threat in Belize. Marsh (2011, p. 269) identifies poaching as a major threat to manatees in Brazil,

Colombia, Costa Rica, Cuba, Dominican Republic, French Guiana, Guatemala, Honduras, Mexico, Suriname, Trinidad and Tobago, and Venezuela. It is no longer a threat in the mainland United States and Puerto Rico (Marsh 2011, p. 269). Poaching has not been observed in Puerto Rico since 1995. We continue to pursue initiatives with other countries that encourage a ban on poaching and hunting of manatees. Foreign governments have instituted regulations to address this threat (see Factor D).

Manatee viewing by commercial tour operators and private citizens occurs in the southeastern United States, Belize, Mexico, and, based on anecdotal accounts, possibly in Puerto Rico. People view manatees from the water; from boats, kayaks, and canoes; and from shoreline areas. These actions may disrupt manatee behaviors and cause them to leave important habitats. Large numbers of people may crowd manatees and also cause them to leave resting, calving or feeding sites.

In the southeastern United States and other areas where people view manatees, numerous measures are in place to prevent the take of manatees due to disturbance of viewing-related harassment. Well-enforced sanctuaries keep people out of sensitive manatee habitats (*i.e.*, warm-water sites), educated tour guides insure that their customers do not harass manatees, and many educational programs prescribe appropriate measures to take when in the presence of manatees. For example, in 1992, manatees stopped visiting suitable manatee habitat (Swallow Caye, Belize) after swim-with-the-manatee programs were allowed without proper control (Auil 1998, p. 12). Community groups and a local conservation organization helped to declare the area a wildlife sanctuary in 2002. The area is currently co-managed between the Belize Forest Department and a

local conservation organization (UNEP 2010, p. 23), and manatees have returned to the area.

In Puerto Rico, harassment of manatees by kayak users and swimmers has been reported in several popular beach and coastal recreational areas. In addition, harassment related to speedboat races in manatee areas has increased. In 2014 alone, the Service reviewed 12 permit applications for speed boat races in Puerto Rico, several of them in areas with high concentrations of manatees. However, to date there have been no reported injuries or deaths of manatees caused by speedboat races. Consultation with the Service under Section 7 of the Act has served to implement specific conservation measures during marine events such as boat races (see **Recovery** and **Available Conservation Measures** sections). The U.S. Coast Guard consistently consults with the Service on marine event applications and readily includes manatee conservation measures when applicable. In addition, government agencies and local nongovernmental organizations have implemented education and outreach strategies to insure that manatee harassment is avoided and minimized.

Education and research programs involving manatees are designed to insure that manatees are neither adversely affected nor overutilized. Examples include outreach efforts used to minimize manatee harassment in Crystal River, Florida, and the Service's ESA/MMPA marine mammal scientific research permitting program, which limits the effects that research activities have on manatees.

Summary: Based on the information discussed above, overutilization is considered a moderate threat to the West Indian manatee, with varying frequencies of

occurrence from absent to common throughout the species' range. This threat is not severe enough to indicate the West Indian manatee is in danger of extinction because measures and efforts are in place to address concerns and are proving effective in a good portion of the West Indian manatee's range. The situation has improved, as poaching is not a threat in the southeastern United States (including Puerto Rico) and has been reduced in other countries. However, it continues to occur in some range countries. We do not believe overutilization for research or education purposes is a threat at this time.

C. Disease or Predation.

While numerous infectious disease agents and parasites have been reported in sirenians, there have been no reports of major West Indian manatee mortality events caused by disease or parasites (Marsh *et al.* 2011, p. 294).

Disease-related deaths are known to occur in West Indian manatees. Recent cases of toxoplasmosis are a concern in Puerto Rico (Bossart *et al.* 2012, p. 139). However, until additional studies are concluded, the severity of this threat is unknown.

Marsh *et al.* (2011, p. 294) stated that the importance of disease as a threat to the manatee is unknown. In spite of concerns about the manatee's ability to rebound from a population crash should an epizootic event occur, the impact of disease on population viability remains unknown (Sulzner *et al.* 2012, p. 1). Marsh *et al.* 2011 (p. 294) speculated that the Florida subspecies appears to have a robust immune system that safeguards them from significant disease outbreaks. We suspect this to be also true for the Antillean subspecies because we have no documented disease outbreaks.

Mou Sue *et al.* (1990) described rare attacks by sharks on manatees in Panama (p. 239). Reported instances of sharks and alligators feeding on manatees are extremely rare (Marsh *et al.* 2011, p. 239).

Summary: Based on the above information, disease and predation are not considered to be a threat to the West Indian manatee at this time.

D. The Inadequacy of Existing Regulatory Mechanisms.

Regulatory mechanisms are in place throughout the West Indian manatee's range. These include, but are not limited to, specific laws and regulations that prohibit specific and general human activities that impact manatees and their habitat, and the establishment of long-term conservation protection measures at key locations throughout the range. In the United States, Florida county MPPs ensure consistent and effective protection throughout the State. Although regulatory mechanisms should be effective and consistent in all countries where manatees are found, the extent and overall effectiveness of these regulatory mechanisms varies widely from country to country. Despite this variability, our assessment of the best available information leads us to believe these efforts are having an overall positive impact on manatee recovery and conservation. However, enforcement and compliance with these measures, as well as the need for additional efforts in some countries, continues to be a concern and will require additional cooperative efforts into the foreseeable future.

Outside the United States, West Indian manatees are protected in most countries by a combination of national and international treaties and agreements as listed in Table 4

in UNEP (2010, p. 14), in Lefebvre *et al.* (2001, entire), and Table 4.2 in Self-Sullivan and Mignucci-Giannoni (2012, p. 41). See Supplemental Document 3 in Docket No. FWS–R4–ES–2015–0178. Countries within the range of the Antillean manatee protect the manatee by national legislation (UNEP 2010, Table 4). For example, in The Bahamas, manatees are protected under the Wild Animals Protection Act (Chapter 248, 21 of 1968 E.L.A.O. 1974), which prohibits the taking or capture of any wild animal (Government of The Bahamas 2004). In 2005, the Bahamian Government also created the Marine Mammal Protection Act (No. 12), which monitors and regulates human interactions with marine mammals. The Act prohibits taking, selling, or harassing any marine mammal (The Government of The Bahamas 2006). As another example, the Manatee Protection Ordinance (1933–1936) provided the first protective legislation for the species in Belize. In 1981, manatees in Belize were included as an endangered species in the Wildlife Protection Act No. 4 of the Forest Department. The Act prohibits the killing, taking, or molesting of manatees, as well as possession and sale of any part of any manatee (Auil 1998, pp. 29–30).

The West Indian manatee is listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES (see www.cites.org) is an international agreement through which member countries work together to protect against over-exploitation of animal and plant species found in international trade. Commercial trade in wild-caught specimens of these Appendix 1 species is illegal (permitted only in exceptional licensed circumstances). The Service reviewed the CITES trade database for the West Indian manatee, which currently has

information from 1977 to 2013, and found that trade does not pose a threat to the West Indian manatee at this time. The manatee and its habitat are also protected by the Cartagena Convention Protocol Concerning Specially Protected Areas and Wildlife for the protection and development of the marine environment of the Wider Caribbean Region (SPAW Protocol). The SPAW Protocol, approved in 1990, prohibits the possession, taking, killing, and commercial trade of any sirenian species (UNEP 2010, p. 14). It stresses the importance of establishing regional cooperation to protect and, as appropriate, to restore and improve the state of ecosystems, as well as threatened and endangered species and their habitats in the Wider Caribbean Region. The manatee is listed in Annex II of the SPAW Protocol. Annex II includes threatened or endangered animal species for which, again, any form of destructions or disruption (capture, possession, killing, trade, etc.) must be banned for their protection and recovery.

Although manatees outside of the southeastern United States are legally protected by these and other mechanisms, full implementation of these international and local laws is lacking, especially given limited funding and understaffed law enforcement agencies (UNEP 2010, p. 89).

Marsh *et al.* (2011, p. 387) indicated that enforcement remains a critical issue for West Indian manatees. Outside the United States, mechanisms are needed to allow existing West Indian manatee protection laws to work as intended. Despite all of the existing regulations for manatees, illegal poaching and destruction of habitat continue (Self-Sullivan and Mignucci-Giannoni 2012, p. 41). Enforcement of conservation policies varies in different coastal regions; in some regions, poaching is common and in

areas with a government presence, enforcement efforts are thought to be significant (Self-Sullivan and Mignucci-Giannoni 2012, p. 45). Poaching occurs in areas where the presence of enforcement personnel is rare (UNEP 2010, p. 64). However, in other areas, like Costa Rica, it does not appear to be significant (UNEP 2010, p. 34). Although we cannot enforce Federal regulations in areas outside of U.S. jurisdiction, we continue to cooperate with other countries' governments under section 8 of the Act, as well as CITES and other international agreements.

In the southeastern United States, in addition to being listed as an endangered species, the West Indian manatee is further considered a depleted stock under the Marine Mammal Protection Act (see greater detail just below; MMPA, 16 U.S.C. 1361 *et seq.*; **Previous Federal Actions** section, and Supplemental Document 2 in Docket No. FWS–R4–ES–2015–0178), as well as the Clean Water Act and the Fish and Wildlife Coordination Act. The MMPA was enacted in 1972 in response to growing concerns among scientists and the public that certain species and populations of marine mammals, including the West Indian manatee, were in danger of extinction or depletion as a result of human activities.

The goal of the MMPA is to protect and conserve marine mammals so that they continue to be significant functioning elements of the ecosystem of which they are a part. The MMPA includes a general moratorium on the taking and importation of marine mammals and their products, with some exemptions (*e.g.*, Alaska Native subsistence purposes) and exceptions to the prohibitions (*e.g.*, for scientific research, enhancement of

the species, and unintentional incidental take coincident with conducting lawful activities).

“Take” is defined under the MMPA as “harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill.” The term “harassment” means “any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild” (Level A harassment), or “has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering” (Level B harassment).

By definition under the MMPA, any marine mammal species or population stock that is listed as an endangered or a threatened species under the Act is considered “depleted” and managed as such under the MMPA. Furthermore, a marine mammal stock that is listed under the Act is considered a “strategic stock” for purposes of commercial fishery considerations. Neither of these categorizations would change with the potential downlisting of the West Indian manatee from endangered to threatened. Both the Florida and Puerto Rico stocks will remain depleted and strategic under the MMPA.

Several additional prohibitions are provided in section 102 of the MMPA, including take of any marine mammal on the high seas; possession of a marine mammal or any product of that marine mammal taken in violation of the MMPA; transport, purchase, sell, export, or offer to purchase, sell, or export any marine mammal or marine mammal product that is taken in violation of the MMPA or for any purpose other than

public display, scientific research, or enhancing the survival of a species or stock; and import of illegally taken marine mammals and marine mammal products. Section 102 further prohibits the import of any marine mammal if the mammal was taken from a depleted species or population stock except under a permit for scientific research or for enhancing the survival or recovery of a species or stock.

U.S. citizens who engage in a specified activity other than commercial fishing (which is specifically and separately addressed under the MMPA) within a specified geographical region may petition the Secretary of the Interior to authorize the incidental, but not intentional, taking of small numbers of marine mammals within that region for a period of not more than 5 consecutive years or, if the potential take is limited to harassment, an authorization may be issued under an expedited process for up to 1 year. Prior to issuance of either authorization, the Secretary must find that the total of such taking during the period will have a negligible impact on such species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses, which only applies to Alaskan Natives as provided under the MMPA.

Section 104 provides for the issuance of permits to authorize the taking or importation of marine mammals for the purpose of scientific research, public display (unless the species or stock is considered depleted), or enhancement of the species. In addition, photography permits may be issued for educational or commercial purposes as long as the subject marine mammals are limited to harassment that only has the potential to disturb them.

Section 118 of the MMPA addresses the taking of marine mammals incidental to commercial fishing operations. This section, which was added to the MMPA in 1994, establishes a framework that authorizes the incidental take of marine mammals during commercial fishing activities. In addition, this section outlines mechanisms to monitor and reduce the level of incidental take. Information from the carcass salvage programs indicate that interactions between manatees and commercial fisheries may occur within waters of the United States but is not a concern at this time.

Title II of the MMPA established the Marine Mammal Commission (Commission), an independent agency of the U.S. Government, to review and make recommendations on the marine mammal policies, programs, and actions being carried out by Federal regulatory agencies related to implementation of the MMPA. The Commission's primary focus and duties are the protection and conservation of marine mammals. The Service coordinates and works with the Commission in order to provide the best management practices for marine mammals.

Within the southeastern United States (including Puerto Rico), the West Indian manatee also receives protection by most State and Territorial agencies, and will continue to receive protection if this downlisting rule is finalized. In Florida, the manatee is protected by the Florida Manatee Sanctuary Act (FMSA), which established Florida as a sanctuary for manatees. This designation protects manatees from injury, disturbance, harassment, and harm in the waters of Florida, and provides for the designation and enforcement of manatee protection zones. However, Florida statutes state that, “[w]hen the federal and state governments remove the manatee from status as an endangered or

threatened species, the annual allocation may be reduced” (FMSA Chap. 379.2431(2)(u)(4)(c)), suggesting that adequate funding could be problematic if downlisting occurs. Florida laws also provide a regulatory basis to protect habitat and spring flows (Florida Water Resources Act).

In Georgia, West Indian manatees are listed as endangered under the Georgia Wildlife Act of 1973 (O.C.G.A. §§ 22–3–130) which prohibits the capture, killing, or selling of protected species and protects the habitat of these species on public lands. In 1999, the Commonwealth of Puerto Rico approved the Law No. 241, known as the New Wildlife Law of Puerto Rico (*Nueva Ley de Vida Silvestre de Puerto Rico*). The purpose of this law is to protect, conserve, and enhance both native and migratory wildlife species, declare to be the property of Puerto Rico all wildlife species within its jurisdiction, and regulate permits, hunting activities, and exotic species, among other actions. In 2004, the PRDNER approved Regulation 6766 to regulate the management of threatened and endangered species in Puerto Rico (*Reglamento 6766—Reglamento para Regir el Manejo de las Especies Vulnerables y en Peligro de Extinción en el Estado Libre Asociado de Puerto Rico*). In particular, the New Wildlife Law of Puerto Rico of 1999 and its regulations provide for severe fines for any activities that affect Puerto Rico’s endangered species, including the Antillean manatee. These laws similarly prohibit the capture, killing, take, or selling of protected species.

Also, the Navigation and Aquatic Safety Law for the Commonwealth of Puerto Rico (Law 430) was implemented in year 2000 and allows for the designation and enforcement of watercraft speed zones for the protection of wildlife and coastal

resources. However, in Puerto Rico and Florida, despite protections, watercraft collisions continue to be a threat to manatees (see Factor E). The PRDNER has indicated that current speed regulatory buoys are ineffective, in part because regulations do not identify the perimeter or area that each buoy regulates (PRDNER 2015, pers. comm.). Thus, emphasis has been given to public education and signage in coastal areas to further reduce manatee mortality.

In addition, there are numerous other manatee protection laws and regulations in place in other States within the United States. These are detailed in a table entitled “Existing International, Federal, and State Regulatory Mechanisms,” see “Supplemental Document 2” in Docket No. FWS–R4–ES–2015–0178 or <http://www.fws.gov/northflorida> and <http://www.fws.gov/caribbean/es>. This table shows an extensive list of existing regulatory mechanisms in place for the West Indian manatee; many have been instituted, revised, or improved to better protect the manatee.

Based on population growth and stability described earlier in this rule (Florida subspecies–6,350 manatees; Puerto Rico–532 manatees), the above-described mechanisms are adequate to continue to allow growth in the West Indian manatee population in the United States and expand protection for their habitat as needed. If this downlisting rule is finalized, the West Indian manatee in the United States will remain protected as a threatened species under the ESA, and as a depleted species under the MMPA, and these existing regulatory mechanisms will remain in effect. As long as funding remains available, recovery actions would continue to be implemented, regulations enforced, and additional measures adopted as needs arise. State and Federal

agencies would continue to coordinate on the implementation of manatee conservation measures.

Summary: Based on the above, the inadequacy of regulatory mechanisms is considered to be a moderate threat to the West Indian manatee. Although numerous regulatory mechanisms to protect manatees exist, challenges in the enforcement of these regulatory mechanisms have been identified. This threat is not severe enough to indicate the West Indian manatee is in danger of extinction. If this downlisting rule is finalized, all regulatory mechanisms will remain in place and will continue to provide legal protections to the species throughout its range.

E. Other Natural or Manmade Factors Affecting Its Continued Existence.

Other factors affecting West Indian manatees include human-related interactions, such as watercraft collisions, harassment, fishing gear entanglement, exposure to contaminants, and naturally occurring phenomena, such as harmful algal blooms, exposure to the cold, loss of genetic diversity, climate change, and tropical storms and hurricanes. In 2007, the Service considered this factor the most significant due to watercraft collisions (USFWS 2007, pp. 32–33).

Watercraft

Watercraft collisions that kill or injure manatees are a threat in some range countries outside the United States. However, current information on the effects of boat traffic on manatees does not exist for most range countries outside the United States. In

some countries such as Belize, watercraft collisions were the predominant cause of death from 1996 to 2003 with an increasing trend (Auil and Valentine 2004, in UNEP 2010, p. 22). As the number of registered boats has increased significantly since the mid-1990s, manatees are most vulnerable to collisions in the waters near Belize City (Auil 1998, in UNEP 2010, p. 22). Motorboats are becoming more abundant and popular in Guatemala, and watercraft traffic and speed are not regulated even within protected areas (UNEP 2010, pp. 45–46). An aquatic transportation system with high-powered engines has increased boat transit in one of the most important manatee habitats areas in Panama (UNEP 2010, p. 66). Increased boating activities in Brazil have resulted in both lethal collisions with manatees and disruption of manatee behavior (Self-Sullivan and Mignucci-Giannoni 2012, p. 43).

Within the United States, watercraft-related deaths have been identified as the most significant anthropogenic threat to manatees in both Florida and Puerto Rico. In Puerto Rico, 34 years of manatee mortality data from 1980 to 2014 indicate that a total of 37 manatees have died due to watercraft (Mignucci *et al.* 2000, p. 192; Mignucci-Giannoni 2006, p. 2; PRDNER 2015, unpubl. data). This number represents approximately 15 percent of the total known mortality cases during that time (37 out of 242) or an average of 1.1 manatees per year. Although 37 deaths may be considered a low number, it can be argued that the percentage of watercraft-related causes of death may be somewhat underestimated for three reasons. First, for the majority of the manatee mortality cases in Puerto Rico, the cause of death is deemed undetermined (38 percent, 92 out of 242), mostly because carcasses are too decomposed when found and a cause of

death cannot be determined, so it may be that many of these deaths are also watercraft-related. Second, watercraft-related effects that may cause a mother and calf separation will go undetected, as it would be challenging to find evidence of such an event. The number of dependent calf deaths in Puerto Rico for the past 34 years is 55 calves (22.6 percent, 55 out of 242) or an average of 1.6 manatee calves per year. The majority of the manatees rescued for rehabilitation in Puerto Rico are calves. Lastly, it is assumed that not all carcasses are recovered, so that there may be additional undocumented deaths caused by watercraft.

On the other hand, carcass salvage numbers for Puerto Rico indicate that the number of watercraft-related deaths is low, and the population is believed to remain stable (see Population Size and Trend sections) in spite of these numbers. As boat use in Puerto Rico has increased in number and distribution (PRDNER 2012, p. 3), and with no State or Federal MPAs yet established, one may expect an increase in watercraft-related conflicts. Still, manatee carcass totals for Puerto Rico have exceeded 10 or more only six times over 34 years and average approximately 7 per year (Mignucci *et al.* 2000, p. 192; Mignucci-Giannoni 2006, p. 2; PRDNER Manatee Stranding Reports 2015, unpubl. data). In addition, calf numbers documented in the most recent aerial surveys indicate the population is reproducing well, with a record high of 23 calves counted in December 2013 (see *Population size* section). As the species continues to move towards recovery, the Service will continue to address and make improvements towards avoiding and further reducing this threat.

A manatee carcass salvage program, started in 1974, collected and examined

manatee carcasses to determine cause of death. This program identified watercraft collisions with manatees as a primary cause of human-related manatee mortality. The recent status review and threats analysis shows that watercraft-related mortality remains the single largest threat in Florida to the West Indian manatee (O'Shea *et al.* 1985, entire; Ackerman *et al.* 1995, entire; Wright *et al.* 1995, entire; Deutsch *et al.* 2002, entire; Lightsey *et al.* 2006, entire; Rommel *et al.* 2007, entire, Runge *et al.* 2015, p. 16;). Runge *et al.* (2015, p. 20) observed that watercraft-related mortality makes the largest contribution to the risk of extinction; full removal of this single threat would reduce the risk of extinction to near negligible levels. Mortality data from FWCs Manatee Carcass Salvage Program and other sources describe numbers of watercraft-related deaths, general areas where deaths occur, trauma, and other parameters (O'Shea *et al.* 1985, entire; Ackerman *et al.* 1995, entire; Wright *et al.* 1995, entire; Deutsch *et al.* 2002, entire; Lightsey *et al.* 2006, entire; Rommel *et al.* 2007, entire).

Over the past 5 years, more than 80 manatees have died from watercraft-related incidents each year. The highest year on record was 2009, when 97 manatees were killed in collisions with boats. The Manatee Individual Photo-identification System (1978 to present) identifies more than 3,000 Florida manatees by scar patterns mostly caused by boats, and most catalogued manatees have more than one scar pattern, indicative of multiple boat strikes. A cursory review of boat strike frequency suggested that some manatees are struck and injured by boats twice a year or more (O'Shea *et al.* 2001, pp. 33–35). The primary conservation action in place to reduce the risk of manatee injury and death from watercraft collisions is a limitation on watercraft speed. The rationale is

that a slower speed allows both manatees and boaters additional response time to avoid a collision. Furthermore, if an impact occurs, the degree of trauma will generally be less if the colliding boat is operating at slower speed (Laist and Shaw 2006, p. 478; Calleson and Frohlich 2007, p. 295). Despite continued losses due to watercraft collisions, the southeastern U.S. manatee population is expected to increase slowly under current conditions (Runge *et al.* 2015, p. 11).

Federal, State, and local speed zones are established in 26 Florida counties. In Brevard and Lee Counties, where watercraft-related mortality is among the highest reported, speed zone regulations were substantially revised and areas posted to improve manatee protection in the early 2000s. Since 2004, the FWC has approved new manatee protection rules for three counties in Tampa Bay and reviewed and updated speed zones in Sarasota, Broward, Charlotte, Lee, and Duval Counties. In October 2005, the Hillsborough County Commission adopted mandatory manatee protection slow-speed zones in the Cockroach Bay Aquatic Preserve that previously had been voluntary. In 2012, speed zones were established in the Intracoastal Waterway in Flagler County. In addition, of the 13 counties identified in 1989 as in need of State-approved MPPs, all have approved plans. Two additional counties, Clay and Levy, proactively developed their own MPPs. Implementation of these protective measures stabilizes and may even reduce the mortality rate from watercraft collisions.

The Service developed programmatic consultation procedures and permit conditions for new and expanding watercraft facilities (*e.g.*, docks, boat ramps, and marinas) as well as for dredging and other in-water activities through an effect

determination key with the U.S. Army Corps of Engineers and State of Florida (the “Manatee Key”) (recently revised in 2013). The Manatee Key ensures that watercraft facility locations are consistent with MPP boat facility siting criteria and are built consistent with MPP construction conditions. The Service concluded that these procedures constitute appropriate and responsible steps to avoid and minimize adverse effects to the species and contribute to recovery of the species.

Fishing Gear

Fishing gear (nets, crab traps, etc.) is known to entangle and injure and kill manatees; ingestion of fishing gear and other debris (monofilament and associated tackle, plastic banana bags, etc.) also kills manatees. In countries outside the United States, the incidental capture of animals in fishing gear is still a threat, and the captured manatees are occasionally butchered and used for food and various products. In Cuba, researchers have recently documented a decrease in the number of manatee deaths within a marine protected area, hypothesized to be due to a ban on the use of trawl net fishing in that area (Sea to Shore Alliance 2014, entire). One of the principal causes of perceived increases in manatee decline along the northern and western coasts of the Yucatan peninsula includes increased use of fishing nets that entangle manatees (Morales-Vela *et al.* 2003, in UNEP 2010, p. 59; Serrano *et al.* 2007, p. 111). In Honduras, the major cause of known manatee mortality in the period 1970–2007 was due to entanglement in fishnets (González-Socoloske *et al.* 2011, p. 123), while Nicaragua reports between 41 and 49 manatees being killed by accidental entanglements in fishing nets from 1999 to 2000

(Jiménez 2002, in UNEP 2010, p. 63). Although gillnets are illegal in Costa Rica, gillnet entanglements still occur there. However, they are uncommon in certain protected manatee use areas (Jiménez 2005, in UNEP 2010, p. 34). Castelblanco-Martínez *et al.* (2009, in Marsh *et al.* 2011, p. 278) suggest that incidental drowning in fishing nets causes almost half of the mortality and wounding of manatees in the Orinoco River in Colombia. A variety of fishing gear was reported to cause manatee entanglements, and at least 43 calves were entangled in gear in northeast Brazil between 1981 and 2002 (UNEP 2010, p. 26). Currently, on the northeast coast of Brazil, the main cause of manatee deaths is due to the constant presence of gill and drag nets (Lima *et al.* 2011, p. 107). Similar to the lack of knowledge regarding the effects of boat traffic on manatees, most range countries outside of the United States do not have current information on the effects of fishing gear and entanglements on manatees.

In Puerto Rico, fisheries-related entanglements and debris ingestion may cause take and reduce fitness of manatees. In July 2009, there was a documented case of entanglement (beach seine net) and successful release of an adult manatee and in 2014, three adult manatees were entangled in large fishing nets; one of them was an adult female that died (PRDNER 2015, unpubl. data). A few manatees have also been found that were severely entangled in monofilament line. These events are considered a low threat because stranding records indicate they rarely cause manatee deaths in Puerto Rico; a total of four (4) in 34 years.

Fishing gear, including both gear in use and discarded gear (*i.e.*, crab traps and monofilament fishing line), is a continuing and increasing problem for manatees in the

southeastern United States. It is unknown if the increasing number of rescues is a reflection of increasing awareness and reporting of entangled manatees, increases in fishing effort, increases in the number of manatees, or other factors. Between 2010 and 2014, researchers attribute 18.2 percent of all rescues to entanglement.

Rescue activities that disentangle manatees have almost eliminated mortalities and injuries associated with fishing gear (USFWS Captive Manatee Database, 2015, unpubl. data). Derelict crab trap removal and monofilament recycling programs aid in efforts to reduce the number of entanglements by removing gear from the water. Extensive education and outreach efforts increase awareness and promote sound gear disposal activities. As a result, deaths and serious injuries associated with fishing gear are now extremely rare. Runge *et al.* (2015, p. 16) determined that marine debris (including entanglements in and ingestion of fishing gear) presented a weak threat to the West Indian manatee in Florida. In the future, we would like to seek opportunities to share information with countries like Cuba, Belize, and Mexico and continue to make entanglement from discarded or current gear a low threat rangewide.

Water Control Structures

Advances in water control structure devices that prevent manatees from being crushed or impinged have been largely successful. In Florida, most structures have been fitted with devices. These devices include acoustic arrays, piezoelectric strips, grates, and bars that reverse closing structures and/or prevent manatees from accessing gates and recesses. Runge *et al.* (2015, p. 16) determined that water control structures presented a

weak threat to the West Indian manatee in Florida and noted that death or injury due to water control structures had become a rare event (2015, p. 19).

Contaminants

Direct and indirect exposure to contaminants and/or chemical pollutants in benthic habitats is another factor that may have adverse effects on manatees (Bonde *et al.* 2004, p. 258). Contaminants are known to have affected one manatee in Puerto Rico (diesel spill), and residues from sugar processing in Cuba are thought to have killed manatees there. Manatees may have abandoned Cuba's largest bay area because of contamination (UNEP 1995 in UNEP 2010, p. 37). There are many activities that introduce contaminants and pollutants into the manatees' environment—gold mining, agriculture, oil and gas production, and others. Despite the presence of contaminants in manatee tissues, the effect that these have on manatees is poorly understood (Marsh *et al.* 2011, pp. 302–305)

Algal Blooms

In Florida, algal blooms pose a localized threat to West Indian manatees. Specifically, in southwest Florida, extensive red tide blooms killed 276 manatees in 2013 (see Table 2). Runge *et al.* (2015, p. 20) noted that on Florida's Gulf coast, red tide effects are stronger than the effect of watercraft-related mortality due, in part, to “the increased estimate of adult survival in the Southwest and the anticipated continued increase in the frequency of severe red-tide mortality.” Runge *et al.*'s (2015, p. 1)

analysis did not address the effect of the 2013 red tide event in its assessment.

In 2011, algal blooms in Florida's Indian River Lagoon clouded the water column and killed over 50 percent of the seagrass beds in the region (St. Johns River Water Management District, 2015). The loss of seagrass beds likely caused a dietary change that may have played a role in the loss of more than a hundred manatees in the area. While algal blooms occur in other parts of the species' range, there have not been any significant die-offs attributable to this cause in this portion of the species' range.

Cold Weather

The Florida manatee subspecies is at the northern limit of the species' range. As a subtropical species, manatees have little tolerance for cold and must move to warm water during the winter as a refuge from the cold. During extremely cold weather, hundreds of animals died in 2010 and 2011 due to cold stress. Notably, animals that relied on Florida's natural warm-water springs fared the best, while animals in east-central and south Florida, where springs are absent, fared the worst (Barlas *et al.* 2011, p. 31). Manatees using seagrass beds along east-central Florida's Atlantic coast cannot easily access warm-water springs of the St. Johns River during periods of cold temperatures, and, in the absence of access to warm water associated with power plants, these manatees are at risk. Since these events, the number of deaths due to cold has returned to an average of roughly 30 per year (FWC FWRI 2015, unpubl. data). While cold stress remains a threat to Florida manatees, Antillean manatees, found outside of the southeastern United States, do not suffer from cold stress because they inhabit warm

subtropical waters. Progress is being made in protecting warm-water sites; we continue to work with our partners to protect these sources to minimize cold-related manatee deaths.

Genetics

Isolated locations, small population sizes, and low genetic diversity increase the susceptibility of West Indian manatee to rapid decline and local extinction (Hunter *et al.* 2012, p. 1631). Low genetic diversity has been identified as a threat to manatee populations in Puerto Rico and Belize (Hunter *et al.* 2010, entire; Hunter *et al.* 2012, entire). In addition, the manatee population in Puerto Rico is essentially closed to immigration from outside sources. Natural geographical features and manatee behavior limits gene flow from other neighboring manatee populations (*i.e.*, Dominican Republic), and genetic mixing is not expected (Hunter *et al.* 2012, p. 1631). Manatee populations in other portions of the range may also be affected by isolation, small population size, and low genetic diversity. Low genetic diversity in the southeastern United States has been identified as a potential concern (Bonde *et al.* 2012, p. 15). However, there is limited detailed genetic information to confirm the significance of this as a threat to the West Indian manatee as a whole.

Tropical Storms

Tropical storms and hurricanes may also pose a threat to manatees. Live manatee strandings and reduced adult manatee survival rates can be attributed, in part, to

hurricanes and storms (Langtimm and Beck 2003, entire, Langtimm *et al.* 2006, entire). Langtimm and Beck (2003) suggest that both direct and indirect mortality (from strandings, debris-related injuries, animals being swept offshore, etc.) and/or emigration associated with hurricanes and storms may cause a decrease in adult survival rates. This result has been observed in Florida and in Mexico: Hurricanes and storms are thought to affect the presence/absence of manatees in storm-struck areas. In Puerto Rico, tropical storms and hurricanes intensify heavy surf, and at least one manatee calf death was attributed to Hurricane Hortense in 1996 (USFWS 2007, p. 33). Other factors can either exacerbate or ameliorate risk to the manatee population, such as density of manatees within the strike area, the number of storms within a season, protective features of the coastline such as barrier islands, or occurrence of other mortality factors (Langtimm *et al.* 2006, p. 1026). However, there is limited information to confirm the significance of tropical storms as a threat.

Climate Change/Sea-level Rise

The Intergovernmental Panel on Climate Change (IPCC) concluded that warming of the climate system is unequivocal (IPCC 2014, p. 3). The more extreme impacts from recent climate change include heat waves, droughts, accelerated snow and ice melt including permafrost warming and thawing, floods, cyclones, wildfires, and widespread changes in precipitation amounts (IPCC 2014, pp. 4, 6). Due to projected sea level rise (SLR) associated with climate change, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and

coastal erosion (IPCC 2014, p. 17). In response to ongoing climate change, many terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, and migration patterns (IPCC 2014, p. 4).

Although SLR is due in part to natural variability in the climate system, scientists attribute the majority of the observed increase in recent decades to human activities that contribute to ocean thermal expansion related to ocean warming, and melting of ice (Marcos and Amores 2014, pp. 2504–2505).

Trend data show increases in sea level have been occurring throughout the southeastern Atlantic and Gulf coasts, and, according to Mitchum (2011, p. 9), the overall magnitude in the region has been slightly higher than the global average. Measurements summarized for stations at various locations in Florida indicate SLR there has totaled approximately 200 millimeters (mm) (8 inches (in.)) over the past 100 years, with an average of about 3.0 mm per year (0.12 in. per year) since the early 1990s (Ruppert 2014, p. 2). The relatively few tidal gauges in Florida, Alabama, Georgia, South Carolina, and southern North Carolina also show increases, the largest being in South Carolina, Alabama, and parts of Florida (NOAA website <http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml>, accessed August 28, 2015).

Continued global SLR is considered virtually certain to occur throughout this century and beyond (Stocker, 2013, p. 100; Levermann *et al.* 2013, entire). Depending on the methods and assumptions used, however, the range of possible scenarios of global average SLR for the end of this century is relatively large, from a low of 0.2 meters (m) (approximately 8 in.) to a high of 2 m (approximately 78 in., *i.e.*, 6.6 feet (ft)) (Parris *et*

al. 2012, pp. 2, 10–11). Although this relatively wide range reflects considerable uncertainty about the exact magnitude of change, it is notable that increases are expected in all cases, and at rates that will exceed the SLR observed since the 1970s (IPCC 2013, pp. 25–26). Given the large number and variety of climate change and SLR models, forecasts of the rate and extent of SLR vary significantly. Because of the variation in projections and uncertainties associated with manatee response to SLR, it will be important to continue monitoring manatee habitat use throughout the species' range.

Other possible effects of climate change include increases in the frequency of harmful algal blooms, increases in the frequency and intensity of storms, losses of warm-water refugia and possible decreases in the number of watercraft collisions. Warmer seas may increase the frequency, duration, and magnitude of harmful algal blooms and cause blooms to start earlier and last longer. Increases in salinity could create more favorable conditions for other species; conversely, increases in storm frequency and extreme rainfall could offset the effects of salinity on algal growth (Edwards *et al.* 2012, p. 3).

Climate change models predict that the intensity of hurricanes will increase with increasing global mean temperature (Edwards *et al.* 2012, p. 4). Langtimm *et al.* (2006, entire) found that mean adult survival dropped significantly in years after intense hurricanes and winter storms. These decreases were thought to be due to tidal stranding, animals being swept out to sea, loss of forage, or emigration of animals out of affected areas (Langtimm *et al.* 2006, p. 1026).

For manatees in the southeastern United States, SLR could mean the loss of most of the major industrial warm-water sites and result in changes to natural warm-water

sites. In the event of a projected SLR of 1 to 2 meters (3.3 to 6.6 feet) in 88 years (Rahmstorf 2010 and Parris *et al.* 2012 in Edwards *et al.* 2012, p. 5), SLR will inundate these sites and warm-water capacity could be lost. While power plants may not be in operation when SLR inundates their sites, the increased intensity and frequency of storms could interrupt plant operations and warm-water production. If storms result in the loss of a power plant, manatees that winter at that site could die in the event that they did not move to an alternate location (Edwards *et al.* 2012, p. 5). Increased intrusion of saltwater from SLR or storm surge coupled with reduced spring flows could reduce or eliminate the viability of natural springs used by wintering manatees (Edwards *et al.* 2012, p. 5).

Climate-change-induced loss of fishing habitat and boating infrastructure (docks, etc.), increases in storm frequency, and pollutants and changes in economics and human demographics could decrease the per capita number of boats operating in manatee habitat. If these changes were to occur, decreases in the numbers of boats operating in manatee habitat could reduce numbers of manatee–watercraft collisions (Edwards *et al.* 2012, p. 7).

Many complex factors with potentially negative consequences are likely to operate on the world’s marine ecosystems as global climate change progresses. Conversely, climate change could potentially have a beneficial effect, as well. Therefore, there is uncertainty regarding how climate change may affect the manatee and its habitat in the future (Hoegh-Guldberg and Bruno 2010 in Marsh *et al.* 2011, p. 313).

Summary: Threats (watercraft, fishing gear, water control structures, contaminants; harmful algal blooms, cold weather, loss of genetic diversity, tropical

storms, and climate change) will continue to have an effect on West Indian manatees. The threats associated with increasing numbers of watercraft will require continued maintenance and enforcement of manatee protection areas, and the adoption of additional areas both inside and outside the United States will continue as needs become apparent. Increasing fishing efforts and the consequent increase of fishing gear in water will require continued efforts to maintain gear in a manatee-safe fashion, additional and continued gear clean-ups, and maintenance of the manatee rescue program to rescue entangled manatees. While most water control structures in the United States have been fitted to prevent impingements and crushings, new structures in the United States must be fitted to minimize impacts to manatees. Existing and new structures outside the United States should be fitted, as well. For manatees in Florida, harmful algal blooms and cold weather will continue to be major threats to this subspecies. Tropical storms and hurricanes will continue to have an effect on the West Indian manatee in most parts of its range. Projections of climate change and sea level rise impacts on West Indian manatees and their habitat are uncertain.

Both Castelblanco *et al.* (2012, entire) and Runge *et al.* (2015, entire) project increasing populations under these threats as they currently exist. Accordingly, we consider threats identified in Factor E to be current threats to the species. There is a high level of uncertainty regarding the overall effects of climate change on the species and its habitat. Thus, we consider the threats identified under this factor to be moderate.

Conclusion

By definition, an endangered species is a “species which is in danger of extinction throughout all or a significant portion of its range” and a threatened species is a “species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” We believe that the West Indian manatee is no longer in danger of extinction throughout all of its range due to significant recovery efforts made throughout its range to address threats as well as a better understanding of manatee population demographics. In the southeastern United States, where the largest population of manatees exists, the manatee population has likely grown, based on updated adult survival rate estimates and estimated growth rates (Runge *et al.* 2015, p. 19). Accordingly, we believe that the West Indian manatee should be reclassified as threatened. Each of these successes is discussed in more detail below.

Human causes of mortality and injury are being addressed throughout the species’ range. Predominant causes include poaching, entanglement in fishing gear, and collisions with watercraft. Poaching has been eliminated in the southeastern United States and in Puerto Rico. Efforts to address poaching outside the United States vary in effectiveness, with successful efforts noted in areas with a significant enforcement presence. Entanglement in fishing gear continues throughout the species’ range. In the southeastern United States, entangled manatees are rescued and very few deaths and serious injuries occur. In Puerto Rico, there have been few entanglements since 1986, when entanglements were first reported as a serious threat. Entanglements outside the

United States are known to occur; however, the magnitude and severity of this threat is unknown.

Watercraft collisions are the predominant anthropogenic cause of death for manatees in the United States. The Service, other Federal agencies, and State and Commonwealth wildlife management agencies continue to be engaged in significant efforts to address and further reduce this threat. In Florida, a network of marked, enforced, manatee protection areas ensure that boat operators slow down to help avoid manatees. In Puerto Rico, manatee protection areas have not been designated, but a number of regulated manatee speed buoys are in place to better protect manatees. Watercraft collisions are known to kill manatees outside the United States; however, available information on the magnitude of this threat in other countries is limited.

Habitat fragmentation and loss are thought to be the greatest single threat to manatees outside the United States. Development activities in coastal and riverine areas destroy aquatic vegetation and block access to upriver reaches and freshwater. Within the United States, Federal, State, and Commonwealth agencies limit habitat losses and those activities that block access through regulatory processes. For example, the State of Florida and the Service rely on county MPPs to address impacts to manatee habitat from installation of, for example, a boat dock or marina. In Florida, the other potential significant threat facing manatees is the loss of winter warm-water habitat. Federal and State agencies are working with the power industry and others to ensure a future warm-water network to sustain manatees into the future. While many strides have been made in this area, work continues to be done to fully address and reduce this threat, as described

above in our review of the Florida manatee recovery plans. In addition, we must continue to address pending changes in the manatees' warm-water network (develop and implement strategies) and support the adoption of minimum flow regulations for remaining important springs used by manatees.

Available population estimates suggest that there may be as many as 13,142 manatees throughout the species' range (see Table 1). Estimates from countries outside the United States (6,250) are largely conjectural and are based on the opinions of local experts. Within the United States, Martin *et al.* (2015, p. 44) and Pollock *et al.* (2013, p. 8) describe population estimates of 6,350 manatees and 532 manatees in the southeastern United States and Puerto Rico, respectively.

Recent demographic analyses (through 2009) suggest a stable or increasing population of Florida manatees (Runge *et al.* 2015, entire) and demonstrate that Florida manatees are not likely to become extinct in the foreseeable future. Castelblanco-Martínez *et al.*'s (2012, pp. 129–143) PVA model for the West Indian manatee describes a metapopulation with positive growth. Runge *et al.* (2015, p. 13) predict that it is unlikely (< 2.5 percent chance) that the Florida population of manatees will fall below 4,000 total individuals over the next 100 years, assuming current threats remain constant indefinitely.

There are numerous ongoing efforts to protect, conserve, and better understand West Indian manatees and their habitat throughout their range, as described in this proposed rule. The contribution of these recovery efforts to the current status of the species is significant. Some threats remain and will likely continue into the foreseeable

future and need to be addressed as appropriate. However, they are not severe enough to indicate that the West Indian manatee is currently in danger of extinction. Given our review of the best scientific and commercial information available and analyses of threats and demographics, we conclude that the West Indian manatee no longer meets the Act's definition of endangered and should be reclassified as threatened.

Significant Portion of the Range

Because we have concluded that the West Indian manatee is a threatened species throughout all of its range, no portion of its range can be "significant" for purposes of the definitions of "endangered species" and "threatened species." See the Service's Significant Portion of its Range (SPR) Policy (79 FR 37578, July 1, 2014).

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing increases public awareness of threats to the West Indian manatee, and promotes conservation actions by Federal, State, and local governments in the United States, foreign governments, private organizations and groups, and individuals. The Act provides for possible land acquisition and cooperation with the State, and for recovery planning and implementation. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

A number of manatees occur in near-shore waters off Federal conservation lands and are consequently afforded some protection from development and large-scale habitat disturbance. West Indian manatees also occur in or offshore of a variety of State-owned properties, and existing State and Federal regulations provide protection on these sites. A significant number of manatees occur along shores or rivers of private lands. Through conservation partnerships, many of these use areas are protected through the owners' stewardship. In many cases, these partnerships have been developed through conservation easements, wetland restoration projects, and other conservation means.

Section 7(a) of the Act, as amended, and as implemented by regulations in title 50 of the Code of Federal Regulations (CFR) at part 402, requires Federal agencies to evaluate their actions with respect to the West Indian manatee within the United States or under U.S. jurisdiction. If a Federal action may adversely affect the manatee or its habitat, the responsible Federal agency must consult with the Service to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of the West Indian manatee. Federal action agencies that may be required to consult with us include but are not limited to the U.S. Army Corps of Engineers, the U.S. Coast Guard, the Environmental Protection Agency, and others, due to involvement in actions or projects such as permitting boat access facilities (marinas, boat ramps, etc.), dredge and fill projects, high-speed marine events, warm-water discharges, and many other activities.

Section 8(a) of the Act authorizes the provision of limited financial assistance for the development and management of programs that the Secretary of the Interior

determines to be necessary or useful for the conservation of endangered or threatened species in foreign countries. Sections 8(b) and 8(c) of the Act authorize the Secretary to encourage conservation programs for foreign listed species, and to provide assistance for such programs, in the form of personnel and the training of personnel.

The Secretary has the discretion to prohibit by regulation with respect to any threatened species any act prohibited under section 9(a)(1) of the Act. Exercising this discretion, the Service developed general prohibitions (50 CFR 17.31) and exceptions to those prohibitions (50 CFR 17.32) under the Act that apply to most threatened species. Our regulations at 50 CFR 17.31 provide that all the prohibitions for endangered wildlife under 50 CFR 17.21, with the exception of 50 CFR 17.21(c)(5), will generally also be applied to threatened wildlife. These prohibitions make it illegal for any person subject to the jurisdiction of the United States to “take” (including to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt any of these) within the United States or upon the high seas, import or export, deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of a commercial activity, or to sell or offer for sale in interstate or foreign commerce, any endangered (and hence, threatened) wildlife species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken in violation of the Act. Certain exceptions apply to agents of the Service and State conservation agencies. These prohibitions would be applicable to the West Indian manatee if this rule is made final. The general provisions for issuing a permit for any activity otherwise prohibited with regard to threatened species are found at 50 CFR 17.32.

The Service may develop regulations tailored to the particular conservation needs of a threatened species under section 4(d) of the Act if there are specific prohibitions and exceptions that would be necessary and advisable for the conservation of that particular species. In such cases, some of the prohibitions and exceptions under 50 CFR 17.31 and 17.32 may be appropriate for the species and incorporated into the regulations, but they may also be more or less restrictive than those general provisions. The Service believes the prohibitions and exceptions set out in 50 CFR 17.31 and 17.32 are most appropriate to address the particular conservation needs of the West Indian manatee at this time.

In Florida, questions regarding whether specific activities will constitute a violation of section 9 of the Act should be directed to the U.S. Fish and Wildlife Service, North Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**). In Puerto Rico, questions regarding whether specific activities will constitute a violation of section 9 of the Act should be directed to the Caribbean Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**). Requests for copies of the regulations regarding listed species and inquiries about prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Ecological Services Division, 1875 Century Boulevard, Suite 200, Atlanta, GA 30345 (telephone 404–679–7101, facsimile 404–679–7081).

Effects of This Rulemaking

This proposed rule, if made final, would revise 50 CFR 17.11(h) to reclassify the West Indian manatee from endangered to threatened on the Federal List of Endangered

and Threatened Wildlife. It would recognize that the West Indian manatee is no longer in danger of extinction throughout all or a significant portion of its range. However, this reclassification would not change the protection afforded to this species under the Act. In addition, even if the West Indian manatee is reclassified from endangered to threatened, it will still be considered depleted and strategic under the MMPA.

We are also proposing to amend the historical range column for the species within the List of Endangered and Threatened Wildlife (List) to clarify the range. As proposed, the text in that column would read: U.S.A. (Southeastern), Lesser and Greater Antilles (including Puerto Rico), Mexico, Central America, South America. The historical range information in the List is informational, not regulatory.

Anyone taking, attempting to take, or otherwise possessing this species, or parts thereof, in violation of section 9 of the Act or its implementing regulations, is subject to a penalty under section 11 of the Act. Pursuant to section 7 of the Act, Federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of the West Indian manatee.

If the West Indian manatee is listed as threatened and this proposed rule is made final, recovery actions directed at the West Indian manatee would continue to be implemented as outlined in the recovery plans (USFWS 1986 and 2001, entire). Highest priority recovery actions include: (1) reducing watercraft collisions with manatees; (2) protecting habitat, including foraging and drinking water sites and, for the Florida subspecies, warm-water sites; and (3) reducing entanglements in fishing gear. Other recovery initiatives also include addressing harassment and illegal hunting in sites where

these occur.

Finalization of this proposed rule would not constitute an irreversible commitment on our part. Reclassification of the West Indian manatee from threatened status back to endangered status would be possible if changes occur in management, population status, or habitat, or if other factors detrimentally affect or increase threats to the species.

Required Determinations

National Environmental Policy Act

We have determined that we do not need to prepare an environmental assessment or environmental impact statement, as defined in the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175, and the Department of the Interior Manual Chapter 512 DM 2, we have considered possible effects on and have notified the Native American Tribes within the range of the West Indian manatee about this proposal. They have been advised through a written informational mailing from the Service. If future activities

resulting from this proposed rule may affect Tribal resources, a Plan of Cooperation will be developed with the affected Tribe or Tribes.

Clarity of This Regulation (E.O. 12866)

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

- (a) Be logically organized;
- (b) Use the active voice to address readers directly;
- (c) Use clear language rather than jargon;
- (d) Be divided into short sections and sentences; and
- (e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in the **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, *etc.*

References Cited

A complete list of references cited is available on <http://www.regulations.gov> under Docket Number FWS–R4–ES–2015–0178 or upon request from the North Florida

Ecological Services Field Office or Caribbean Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this document are the staff members of the North Florida Ecological Services Office and Caribbean Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

List of Subjects in 50 CFR Part 17

Endangered and Threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

Part 17— ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245; unless otherwise noted.

2. Amend § 17.11(h) by revising the entry for “Manatee, West Indian” under “MAMMALS” in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
MAMMALS							
*	*	*	*	*	*	*	
Manatee, West Indian	<i>Trichechus manatus</i>	U.S.A. (Southeastern), Lesser and Greater Antilles (including Puerto Rico), Mexico, Central America, South America	Entire	T	1, 3, ____	17.95(a)	17.108(a)
*	*	*	*	*	*	*	

* * * * *

Dated: December 18, 2015.

James W. Kurth

Director, U.S. Fish and Wildlife Service.